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AN EPIDEMIOLOGICAL STUDY OF POLIOMYELITIS IN MISSISSIPPI IN 1941 [1]

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This study of poliomyelitis comprised (1) collection and collation of mortality and morbidity statistics from the records of the Mississippi State Board of Health and local health agencies; (2) surveys of local conditions thought possibly to influence the widely varying rates of incidence of the disease in different parts of the State; (3) collection and analysis of clinical and other data on 133 of the 148 cases reported as poliomyelitis and retained as such on the official records for the period January 1 to November 1, 1941; and (4) obtainment by home visits of 99 fairly comprehensive detailed epidemiological case histories.

INCIDENCE

Table 1 shows the number of deaths from poliomyelitis reported and officially recorded in Mississippi by years from 1914 to 1941, inclusive. It appears that the years of comparatively high mortality (each with 20 or more deaths) in this 28-year period were 1914, 1916, 1926, 1927, 1934, 1936, 1937, and 1938. Thus the intervals between the years of high recorded mortality have been very irregular.

TABLE 1.—*Deaths from poliomyelitis reported by years and race in Mississippi from 1914 to 1941*

Year	Total	White	Colored	Year	Total	White	Colored
1914	23	8	15	1928	18	13	5
1915	3	0	3	1929	15	6	9
1916	31	14	17	1930	13	3	10
1917	9	4	5	1931	12	8	4
1918	9	3	6	1932	17	10	7
1919	19	9	10	1933	8	6	2
1920	10	7	3	1934	20	14	6
1921	11	8	3	1935	9	5	4
1922	15	5	10	1936	22	12	10
1923	14	6	8	1937	59	34	25
1924	14	9	5	1938	22	13	9
1925	19	13	6	1939	16	13	3
1926	25	16	9	1940	14	5	9
1927	20	14	6	1941	19	10	9

[1] The study was begun on August 11, 1941, and was terminated on November 15, 1941. It was sponsored by the National Foundation for Infantile Paralysis, Inc., and was carried out in active cooperation with the Mississippi State Board of Health and the Mississippi county health departments.

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Of the last 12 years, those of comparatively high recorded morbidity (each with over 100 cases) have been 1936, 1937, and 1941. The concentration in 1936 was in the northeastern section of Mississippi in juxtaposition to the localized areas of high incidence in Alabama and Tennessee (*1*); in 1937 it was in the southwestern section of the State, included in the large Mississippi Valley region of high incidence that year (*2*), and in 1941 it was in a group of several adjacent counties in the west central section of the State.

DIAGNOSIS

Inasmuch as epidemiological data collected on cases reported as poliomyelitis under erroneous diagnoses are worse than none, in that they are positively misleading, special effort was made throughout the study to determine as thoroughly as practicable the clinical, laboratory, psychological, and other bases for the diagnoses of the cases recorded in 1941. The effort included (1) consultation with attending private physicians and local health officers and review of their records, (2) review of laboratory findings, (3) physical examination of patients and obtainment of detailed clinical histories from their families at home, (4) review of the records of the poliomyelitis clinics maintained with the support of the National Foundation at Jackson, Miss., Memphis, Tenn., and Mobile, Ala., and (5) constant exercise of all of the clinical knowledge and common sense available to those engaged directly in the epidemiological study.

In frequent instances the diagnosis was made and the case reported after only one brief superficial observation of the patient by the family physician. In some cases the diagnosis was changed by the reporting physician after further observation of the patient and consultation with the county health officer. Some cases remained on the official records although the county health officer became thoroughly satisfied from his observations and consultations that the cases were not poliomyelitis.

In Mississippi and in a number of other States a case reported as poliomyelitis by a private physician remains on the official record as a case of poliomyelitis unless the reporting private physician changes the diagnosis and advises the local health department of the change. It would appear altogether advantageous that qualified full-time local health officers have, and exercise for statistical and other official purposes, definite and full authority in the establishment of *official* diagnoses of cases of infectious disease.

A number of cases originally reported and remaining on the official records as poliomyelitis in Mississippi in 1941 were found by observations made after the original reporting to be cases of acute articular rheumatism, infected femoral or inguinal gland, mechanical injury, infected toenail with resulting lameness, or other conditions presenting

syndromes which only vaguely and only at a hurried superficial glance could have suggested a suspicion of poliomyelitis. The thorough diagnostic work at the poliomyelitis clinic in Jackson, to which were sent for treatment many of the cases in Mississippi in the summer and fall of 1941, was of much specific aid to the epidemiological study.

Here and there a practicing physician appeared to become poliomyelitis-minded and to fancy he could make a skilled definite diagnosis of abortive poliomyelitis among persons who had had no traceable association with paralytic cases of the disease. Some of the cases reported as poliomyelitis after such diagnosing were later found to have been cases of upset stomach of only a few hours' duration in babies, slight acute coryza or tonsillitis, transient diarrhea with only two or three liquid passages, or other conditions of frequent occurrence in communities. Of course, some of these cases may have been attended or caused by poliomyelitis infection, but it seems highly probable that most of them were not properly diagnosable as poliomyelitis.

In one county outside the area of established high incidence nine cases were reported and recorded. The recorded incidence in that county with its sparse population was of outbreak proportion. It was found, however, by subsequent studies at the poliomyelitis clinics and elsewhere that six of these cases were due to conditions other than poliomyelitis.

From a leading practicing physician in a community here and there unusual or original views as to the nature of poliomyelitis were obtained. One contended that all bad colds are poliomyelitis. Another contended that all cases of poliomyelitis are caused by malaria parasites. A few depended largely upon a skin reaction to Rosenow serum for a positive diagnosis. However, the large majority of the doctors of Mississippi with whom consultation was held regarding the diagnosis of reported or suspected cases appeared to have views based on what is generally considered the best available recent knowledge as to the nature of the disease.

In a few cases the clinical and laboratory evidence did suggest mixed infection with poliomyelitis virus and malaria parasites or even the possibility of malaria parasites alone causing the damage to the motor areas of the brain or spinal cord.

In some areas, especially those with a winter case or only one case to a county, more time in the epidemiological study was spent in an effort to determine whether the diagnoses were warranted than in the taking of complete epidemiological histories. Most of the winter cases appeared to have been reported under mistaken diagnoses.

Thirty-four of the 133 cases covered in considerable detail by the epidemiological study were eliminated for detailed comprehensive epidemiological consideration because they appeared certainly or

almost certainly to be reported under erroneous diagnoses. Some of the 34, because of subsequent clinical developments and skilled diagnostic observations, were eliminated after the complete epidemiological histories had been taken. In the course of the study, a few unrecorded cases with either paralysis or strongly suggestive systemic symptoms without paralysis were found and added to the epidemiological list. The general evidence, however, was that in Mississippi in 1941 the cases reported as poliomyelitis under erroneous diagnoses exceeded the number of unreported cases which, under skilled diagnostic procedure, could have been diagnosed definitely as poliomyelitis.

AGE, SEX, AND RACE DISTRIBUTION

The age-sex-race distribution of the cases reported and retained on the official records as poliomyelitis in Mississippi for the period January 1 to November 1, 1941, is shown in table 2.

TABLE 2.—*Cases of poliomyelitis, by age, sex, and race, reported and retained on the official record for the period January 1 to November 1, 1941*

Age in years	White				Negro			
	Male	Female	Total	Percentage	Male	Female	Total	Percentage
Under 5	22	19	41	46.2	17	14	31	52.5
5–9	13	11	24	27.0	6	7	13	22.0
10–14	13	5	18	20.2	6	4	10	17.0
15–19	0	1	1	1.1	2	1	3	5.1
20 and over	4	1	5	5.5	1	1	2	3.4
Total	52	37	89	100	32	27	59	100

The reported incidence per 100,000 population was 8.9 for white persons and 5.8 for Negroes. The difference may have been due in part to more nearly complete reporting of the white cases, but the general evidence obtained in the course of the study was that the actual incidence rate of definite paralytic cases was considerably higher among white persons than among Negroes.

The larger proportion of the total of Negro cases than that of the total of white cases among children under 5 years of age is not sufficient to have much, if any, epidemiological significance. Table 1 shows that in some years, especially in 1914, 1922, 1930, and 1940, the reported deaths among Negroes far exceeded those among white persons. In those years either the morbidity rate or the case fatality rate probably was comparatively high among Negroes.

GEOGRAPHICAL DISTRIBUTION

The distribution of the 148 cases reported and retained as poliomyelitis on the official records for the period January 1 to November 1, 1941, in the 82 counties in Mississippi was as follows: In 29 counties, none; in 22 counties, 1 each; in 12 counties, 2 each; in 8 counties, 3

each; in 5 counties, 4 each; in 1 county, 5; in 1 county, 7; in 2 counties, 9 each; in 1 county, 10; and in 1 county (Yazoo) 18. The counties free from reported incidence are mainly in the east central, the southeastern, and the southwestern sections of the State.

The incidence rate per 100,000 population for the State as a whole was 6.3. The aggregate population of the 29 counties without a case is 573,445. One of the counties without a reported case is Harrison, a resort county, with a population of over 50,000 and with constant passage through it daily of traffic from far and wide. Among the counties with only 1 reported case and with a population of over 40,000 were Coahoma (in which is the city of Clarksdale) and Lauderdale (in which is the city of Meridian), both traversed by heavy lines of intrastate and interstate traffic. The incidence showed no consistent tendency toward concentration along main lines of human travel nor along main river courses nor in urban centers. The incidence was comparatively high, however, in an area comprising 5 counties traversed by an interlacing system of railway freight traffic. Over two-thirds of the cases were in open-country homes which frequently were found to be among the most isolated of the State, on large plantations, or in dense forest regions. These open-country homes were generally from 5 to 50 miles apart—the travel by most direct course required to visit the two nearest to each other often being 30 to 60 miles or more.

In the 12 cities with populations of over 10,000, the incidence of reported cases was as follows:

City	Population (1940 U. S. Census)	Number of cases	Cases eliminated (erroneous diagnoses)	City	Population (1940 U. S. Census)	Number of cases	Cases eliminated (erroneous diagnoses)
Biloxi	17,475	0		Jackson	62,107	4	2
Clarksdale	12,168	0		Laurel	20,598	1	
Columbus	13,645	1		Meridian	35,481	1	
Greenville	20,892	1		Natchez	15,296	0	
Greenwood	14,767	2		Vicksburg	24,460	2	
Gulfport	15,195	0					
Hattiesburg	21,026	3	1	Total		15	3

Thus the reported incidence in the larger urban centers was 5.5 per 100,000 population and the actual incidence of definitely diagnosable cases probably was less. For the rest of the State, the reported incidence was about 7 per 100,000 population.

There was a definite concentration of reported incidence in 1 region embracing 5 adjacent counties in the west-central part of the State—Yazoo with 18 cases, Holmes with 10, Hinds with 9, Madison with 7, and Le Flore with 5. Yazoo County had the largest number of cases and the highest incidence rate for any county in the State. The rate per 100,000 population for Yazoo County was 45; for Holmes County, 23; for Madison County, 18; for Le Flore County, 9, and for Hinds County, 8.

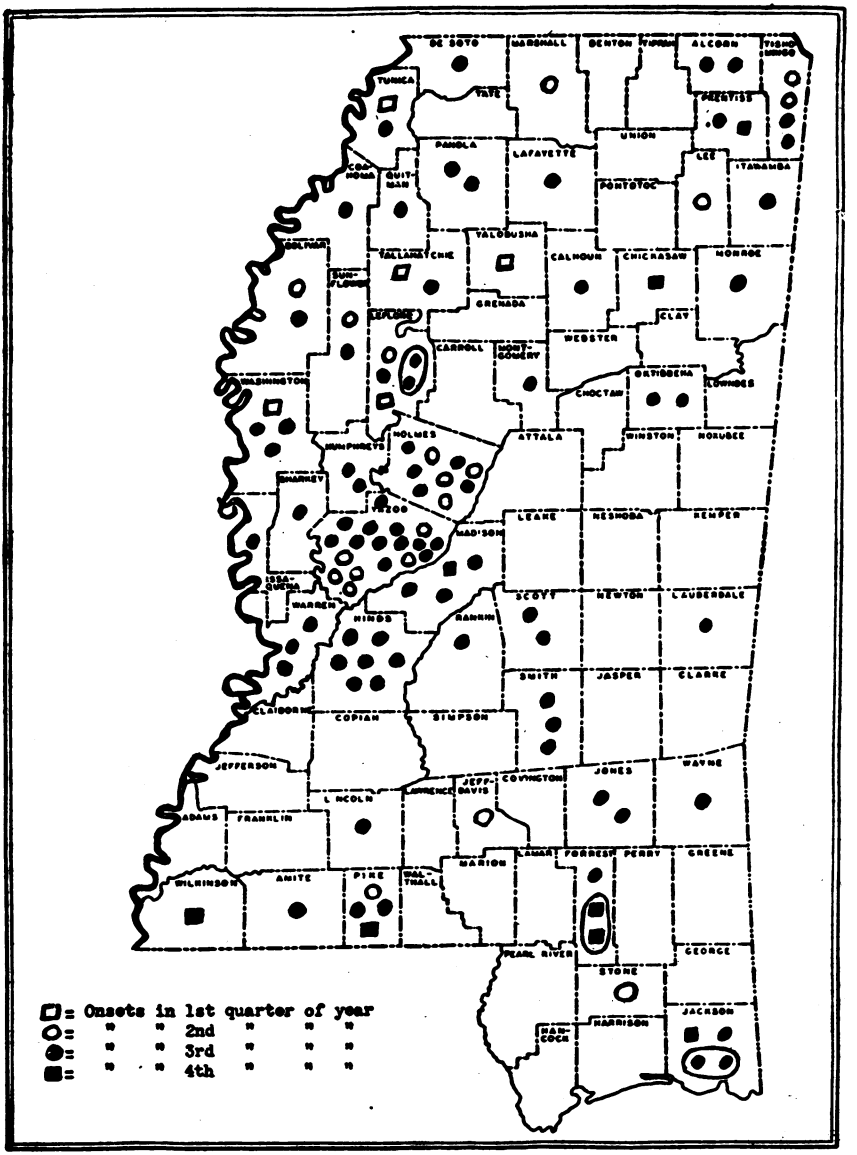

FIGURE 1.—Poliomyelitis recorded in Mississippi from January 1 to November 1, 1941. Cases allocated to place of residence, by counties; period of onset of infection indicated; cases of erroneous diagnoses eliminated.

Figure 1 shows the distribution of cases by place of residence, and the period during which the infection was considered to have been contracted. Not included on this map are the 34 reported cases in which the diagnoses were regarded as certainly or almost certainly erroneous and 1 case, reported in Oktibbeha County, in which the infection very probably was contracted in Alabama. Except for the concentration in the Yazoo County region, the geographical distribu-

tion was widely and thinly scattered. Such geographical distribution appears to have definite epidemiological significance. It is evident that some factor or set of factors operated in the Yazoo County region different in kind or degree from any or all which operated generally in the other large regions of the State. Though analogies are dangerous in epidemiological analyses, the wide, thin distribution of "sporadic" cases of poliomyelitis is somewhat remindful of that of sylvatic plague in the western States or of Rocky Mountain spotted fever in the eastern States.

SEASONAL PREVALENCE

Of the total of 148 cases, 12 had onsets prior to June 1: 1 in January, 4 in February, 2 in March, 1 in April, and 4 in May. From the data obtained, it appears that almost all of the cases with onsets prior to May were reported under erroneous diagnoses.

Of the 99 cases of which detailed histories were obtained, the onsets were: 1 in February, 1 in March, 3 in May, 16 in June, 28 in July, 29 in August, 13 in September, and 8 in October.

In Mississippi in 1941 warm summer-like weather continued through almost all of October; but in some of the counties, each with two or more cases, the onset of the last case found was before the beginning of cool weather. In Yazoo County the onset of the first recorded case was on May 28 and that of the last on August 28. Thus, the period of high incidence, though beginning soon after the advent of warm weather, terminated in most of the affected counties before the warm weather period was over.

EXTENT AND METHOD OF OBTAINING EPIDEMIOLOGICAL HISTORIES OF CASES

Detailed epidemiological histories were taken of 99 of the 148 cases; 34 cases were eliminated because they were determined certainly or almost certainly to have been reported under erroneous diagnoses, and 15 were studied only to the extent of data furnished by report cards. Of the 15 cases not studied comprehensively, 1 occurred in each of the following counties: Calhoun, Chickasaw, Coahoma, De Soto, Itawamba, Marshall, Monroe, Quitman, and Yalobusha; Smith, Tishomingo, and Tunica counties each had 2 cases.

The 99 detailed epidemiological case histories were obtained by consultation with local health officers and/or attending physicians and by visits to the affected homes where painstaking interviews were held with the families and surveys made of the immediate and neighboring premises. Interviews with the families averaged about 50 minutes. Questions were asked with a persistent and consistent effort to obtain facts instead of just answers. The interviews were

exhaustive and often somewhat exhausting. The attitude of the families, without a single exception, was cordial and cooperative.

The form used in obtaining the data was designed to be adequately comprehensive. Its scope is indicated by the numerous items covered under the heading of "Findings" in this report. Some students of the epidemiology of poliomyelitis might regard some of the data collected as unnecessary or irrelevant. However, there are valid reasons for every one of them. For example, to the question of what could shade trees or fruit trees on the premises have to do with the causation of poliomyelitis, the answer would be (1) at a home with shade trees in the yard, the members of the family, children in particular, are likely in warm, fair weather to spend much of their time under the trees, which furnish frequent resting or nesting places for birds and harborage for insects; (2) frequently excreta and often, perhaps, ectoparasites from birds and tree climbing mammals fall into the yard under the trees; (3) fruit trees when blossoming or when bearing fruit attract insects, birds, and other animals; and (4) there remains at least a possibility that some bird or other lower animal serves as a harborage and some insect serves as a vector of some of the varieties of poliomyelitis virus.

Throughout the study in Mississippi in 1941, the fact was kept in mind that we were dealing with a disease, with factors of causation of which there is little or no definitely established knowledge. Therefore, open-mindedness and broad-mindedness and consistent effort to collect every fact which eventually may prove illuminating appeared in order. A valid objection which might be raised against the program is lack of controls. To try to meet this to a limited extent, general surveys were made, usually of neighboring homes and of vicinities intervening between affected homes. In a way all of the unaffected homes in a region serve as a sort of control. It would be difficult to decide how many unaffected homes would have to be studied in detail in order to serve as reasonably satisfactory controls. Encouraging, however, is the fact that without many of the theoretically desirable controls, field epidemiological studies accomplished much in the establishment of definite knowledge of the modes of spread of many infectious diseases, such as typhoid fever, yellow fever, typhus fever, cholera, plague, and so forth.

Another objection which may be raised is that the number of cases covered by the study was too small for the data to have much epidemiological significance. This objection is valid to some extent, but not altogether. Intensive study in a locality with a few cases may be even more clarifying than such study in a comparable locality with many cases where there are likely to be more potentially misleading coincidences with regard to personal contact and other possible factors. It appears reasonable to hope that the program of study

in Mississippi in 1941 will prove eventually of some value in the formulation of a large-scale program of study. Such a study covering hundreds or even thousands of cases in different regions of the country would produce data from which many now apparently possible factors could be eliminated and thus the field for the "rifle work" of our research laboratories might be narrowed advantageously.

FINDINGS

The data presented under this heading apply to the 99 cases of which detailed epidemiological histories were taken and, unless otherwise specified, to the period of 30 days immediately preceding the onset of illness.

Location of affected homes.—Of the 99 cases, 69 were in homes in open country, 6 in homes in villages with populations under 2,500, 13 in homes in towns or cities with populations of 2,500 to 10,000, and 11 in homes in cities with populations of over 10,000.

Twenty-one of the cases were in homes located within a county-seat city, town, or village; 2 in homes within 1 mile, 6 in homes 1–4 miles, 13 in homes 5–9 miles, 18 in homes 10–14 miles, 18 in homes 15–19 miles, and 21 in homes 20 or more miles from the county seat.

Thirty-four of the cases were in homes on a main highway or on a city, town, or village street; 12 in homes within 1 mile, 32 in homes 1–4 miles, 17 in homes 5–9 miles, 3 in homes 10–14 miles, and 1 in a home 15–19 miles from a main highway.

Eleven homes were 1–4 miles from any city, town, or village; 12, 5–9 miles; 3, 10–14 miles; and 1 home over 20 miles.

The homes in cities or towns where cases occurred were generally on the outskirts where conditions with respect to privies, cows, chickens, and so forth, were more rural than urban in character.

Economic status.—Economic status of the families of the patients was good for 7, fair for 29, and poor for 63.

Birthplace of patients and parents.—Seventy-six patients were born in the present home vicinity, 15 elsewhere in Mississippi, and 8 outside Mississippi. Of the fathers, 91 were born in Mississippi and 8 outside the State. Eighty-nine mothers were born in Mississippi and 10 elsewhere. The large majority of cases were in persons who had spent all or nearly all of their lives in Mississippi, mostly in their present home vicinities. The poliomyelitis incidence was largely among persons of local stock.

Visits outside immediate home vicinity.—Only 35 of the cases were in persons who had been outside their immediate home vicinities. A considerable number had remained strictly at home or had been to only 2 or 3 nearby homes. The evidence is that only about 12 probably contracted the infection while away from their immediate home vicinities, in other parts of Mississippi, or in neighboring States.

Places of public assemblage.—The following number of persons had been to places of public assemblage: public bathing beaches or pools, 5; public playgrounds, 9; picnics, 4; camps, 3; county fairs, 2; schools, 6; moving-picture shows, 19; and churches, 41. No two cases gave histories of having been to the same church or other place of public assemblage.

Clinical features.—From all evidence obtained, 69 of the cases appeared to be definite clinical cases of poliomyelitis. In the 30 others the diagnoses seemed very probably correct for 14 and questionable for 16. The presence of paralysis or localized muscular weakness did not always assure the correctness of diagnosis because in some cases the possible or probable effect of syphilis, rickets, mechanical injury, or some other disease or condition came into the picture.

In 60 of the cases there was definite paralysis; in 33, localized muscular weakness; and in 6, neither definite paralysis nor localized muscular weakness.

The anatomical distribution of paralysis or of localized muscular weakness was as follows:

Paralysis:	Cases
One or both lower extremities only	33
One or both upper extremities only	7
One or both upper and one or both lower extremities	10
Both legs, lower abdomen, bowel, and bladder	1
Both arms and right side of face	1
Right side of face, right arm, and right leg	1
Left side of face, left arm, and left leg	2
Both arms, bladder, and respiratory	1
Both legs and arms, and throat	1
Throat and respiratory	1
Both legs and respiratory	1
Right forearm	1
Total	60

Localized muscular weakness:	
One or both lower extremities only	25
Upper extremities only	3
Left arm and left leg	2
Left leg, left thumb, and left index finger	1
Both legs and both arms	2
Total	33

Such distribution appears of both pathogenical and epidemiological significance. If the virus travels up nerve tracts to reach the spinal cord or the brain, as is suggested by recent laboratory findings, including especially those of Bodian and Howe (*3*), the marked preponderance of cases with lower extremity involvement over those with upper extremity involvement suggests that the invasion is most commonly through the nerve tracts of the lower extremities or of the

lower part of the trunk instead of through the nerve tracts of the upper respiratory passages, the upper alimentary tract, the upper extremities, or the upper part of the trunk. Of interest in this connection is that in Howe and Bodian's feeding experiments on chimpanzees, with technique designed to prevent invasion through the upper respiratory tract or the pharynx, the motor involvement appearing to result was confined to the upper extremities (*4*). The distribution of motor involvement in cases with natural infection along with the evidence that generally the lower extremities, especially of children, are more exposed than other parts of the body to insect invasion appears to give support to the argument of those who contend that insects should be considered as possible vectors of poliomyelitis infection of persons. Also to be considered is the reported distribution of the paralysis, altogether in the upper extremities, in 11 or 12 children whose cases were attributed (*5*) to an attenuated virus which with prophylactic intent had been injected into or under the skin of the arms. It appears at least conceivable that if the virus can be introduced effectively into the skin with a hypodermic syringe, it may be done also by the proboscis of an insect

An unusual feature observed was the occurrence of fever blisters on the lips concurrently with the attack of poliomyelitis in 17 cases. These cases mostly were in the Delta region where malaria was prevalent.

POSSIBLY PREDISPOSING RECENT ILLNESS OR CONDITIONS

Illness or condition	*Months prior*	*Cases*
Measles	Under 2	4
	3	1
	4	1
	5	1
Mumps	Under 1	2
	2	2
	3	1
	6	1
	8	1
Whooping cough	Under 2	3
	2	4
	3	1
	4	1
	5	1
Colitis or dysentery	1	3
	2	1
Malaria	1	5
	2–12	4
Chickenpox	Under 3	2
Pronounced rickets		2
Pronounced adenoids		2
Chorea		2
Pyelitis		2
Frequent or recent sore throat or tonsillitis		23
Frequent or recent acute coryza		29
Otitis media		4
Foul mouth		9
Habitual constipation		21

Tonsillectomy within 2 months in 1 case; 1–10 years prior in 10 cases.

Unusual physical stress or mechanical injury within 3 weeks prior in 21 cases.

Recent open skin sores (mainly impetigo), infected insect bites, or unhealed wounds on lower extremities, or boils on parts of the body below the waistline in 41 cases.

The number of cases with preceding recent or frequent sore throat, tonsillitis, or acute coryza might suggest to some observers an upper respiratory invasion by the poliomyelitis virus. The frequency of open skin sores on the lower extremities within the 2 or 3 weeks immediately before onset of poliomyelitis along with the anatomical distribution of the paralysis might suggest to others insect conveyance of the poliomyelitis virus.

Among the especially interesting cases was that of a Negro girl, 5 years of age, in Greenwood City. As the eruption from a case of measles was beginning to fade, she developed a high fever followed within a day or two by a left hemiplegia. The face involvement disappeared in about 2 weeks. Three months after the onset, the lower extremity was nearly normal but the muscles of the arm and forearm were limp, functionless, and atrophied.

Artificial immunization.—Of the 99 cases, 22 had had no artificial immunization against any specific disease. The number that had had artificial immunization against one or more of such diseases with the time before the attack of poliomyelitis indicated was as follows:

Immunization against—	Number immunized							
	Prior period (years)							Total cases
	½	1	2	3	4	5	Over 5	
Smallpox	8	6	12	4	4	4	3	41
Diphtheria	6	9	11	10	6	1	9	52
Typhoid fever	4	16	2	7	1		3	33
Whooping cough	1	1	3	1				6
Scarlet fever				1				1
Tetanus			1					1
Rabies			1					1

Poliomyelitis among near relatives.—Among the 99 current cases, 10 were in persons with near relatives who had had poliomyelitis in previous years. The relationship of the previously affected persons to the patients of 1941 was as follows: mother, 2 cases; half-brother, 1 case; uncle, 2 cases; first cousin, 4 cases, and second cousin, 1 case.

Personal characteristics.—Data on personal characteristics were not noted in six of the cases. For the 93 others the following were especially noted:

General health: Good, 63; fair, 18; poor, 12.
Complexion: Fair, 41; medium, 9; dark, 4; Negro, 39.
Spacing of upper incisor teeth: Excessive in 7; normal in 86.
Cutting of teeth: Slow, 5; poor, 2; early, 1; normal, 85.
Rate of physical growth: Slow, 8; rapid, 3; normal, 82.
Body structure: Thin or poor, 19; marked over development, 2; normal, 72.
Physical activity: Over, 22; under, 6; normal, 65.

The general health, physical development, and nutrition found among Negro children on the cotton plantations in the Delta region were remarkably and somewhat surprisingly good.

Among the white children attacked by poliomyelitis, the proportion with fair complexions, many of them very fair, was striking. In rather frequent instances the child with the lightest complexion in a family was the one stricken. Some observers suspect that persons of fair complexion are especially attractive to certain insects.

Household servants.—Only 13 of the cases were in households in which servants were employed. In all instances except one the servant lived at night away from the home of employment. A search was made for definite and also possible clinical cases at the homes and in the immediate home vicinities of the servants. No evidence was obtained suggesting that servants had any important connection in the spread of the infection.

Swimming or wading.—Only 14 of the patients gave histories of having been swimming or wading in creeks, rivers, or lakes, and only 2 of having been in public park pools.

General cleanliness of premises.—Eighteen of the cases were on premises where general cleanliness was good; 43 where it was fair; and 38 where it was poor.

Personal cleanliness.—This was rated as good in the families of 23 of the cases; fair in those of 34, and poor in those of 42.

Body surface exposure to polluted water.—Such exposure appeared probable for 63 of the cases—4 direct, 5 through domestic animals, and 54 through insects.

General character of neighborhood.—Fifteen of the cases were in open-country wooded neighborhoods, 35 on large plantations, 15 in small farm neighborhoods, 6 in suburbs, 14 in thickly built-up urban-like communities and 12 in scattered village-like neighborhoods. The character of the neighborhood was not recorded for 2 cases.

Topography.—Twenty of the 96 affected homes were in hilly vicinities, 35 in rolling, 26 in flat (delta) and 15 in flat (but not delta) vicinities.

Structure and condition of dwelling.—Frame 93, stucco 2, brick 1. Of 90 affected homes where structural condition of dwelling was noted, it was rated as good for 15, fair for 30, and poor for 45.

Age of dwelling.—Under 10 years, 20; 10–19 years, 22; 20 years or more, 54.

Cellar or basement.—Only three of the affected homes had a cellar or basement under the dwelling.

Screening of dwelling.—Complete, 24; partial and inadequate, 34; and none, 38.

Shade trees in yard.—None, 22; present, 74.

Fruit trees, shrubs, or vines on premises.—Peach, 56; pear, 20; apple, 9; plum, 9; fig, 7; grape, 7; mulberry, 2; persimmon, 1; banana, 1; cherry, 1.

Stables or animal pens on immediate or very nearby premises.—For hogs or pigs, 27; for horses or mules, 47; for cows, 36; for chickens, 50.

Domestic animals on or nearby home premises.—Horses on 60, mules on 65, cows on 94, sheep on 7, goats on 5, hogs on 48, dogs on 58, cats on 58, chickens on 87, guineas on 15, ducks on 4, geese on 7, and turkeys on 3. Thus, cows and chickens were most prominently in the picture. There was a history of deaths or of some sort of sickness among some of the animals on 32 of the affected premises within a few weeks before or after the onset of the case of poliomyelitis. At only 2 of the affected homes was a history obtained of "range paralysis" among the chickens.

Wild mammals and birds especially noted on premises or in the immediate vicinity.—Sparrows at 96, rabbits at 60, squirrels at 43, foxes at 23, hawks at 21, crows at 23, skunks at 17, opossums at 18, pigeons at 5, and, in addition to those specified, various birds at 73. English sparrows were most prominently in the picture.

Four of the cases were in children who, from 1 to 2 weeks before onset of illness, had handled sick or dead birds. In three instances the birds were sparrows and in one a field lark. There is some probability that the sickness and death among these birds was due to arsenic used in dusting cotton plants.

Insects.—Especially noted among insects at the 96 affected homes were houseflies and stable or dog flies (*stomoxys calcitrans*) at 96, fleas (in the dwelling) at 51, mosquitoes at 94, wasps at 74, honey bees at 14, ants (in the dwelling) at 60, roaches at 48, gnats (biting, or "eye," or both) at 76, bluebottle or green flies at 41, horseflies (large) at 73, bedbugs at 32, spiders (in the dwelling) at 17, chiggers (red bugs) at 5, and woodticks at 1. Obviously there were plenty of insects for speculative purposes. Among the most conspicuous were *stomoxys calcitrans*, houseflies, and mosquitoes. There was a history of mosquitoes at all of the affected homes except 2. These 2 homes are located in high ridge regions. The diagnoses of the cases at these 2 homes were somewhat doubtful.

Stomoxys calcitrans appeared unusually abundant and voracious in Mississippi in the summer of 1941. In view of the evidence that this insect will fly over 12 miles within a few hours and over 50 miles within 9 days, that it is spread widely by livestock hauled by truck or railway car, that it frequently feeds on man and beast, and that it once had prominence in reported findings from laboratory studies of poliomyelitis, it seems that *Stomoxys calcitrans* properly might again be considered by research laboratory workers for intensive trial to determine

as definitely as possible whether or not it may serve as a vector of some of the varieties of poliomyelitis virus.

Standing or running water apparently suitable for the breeding of mosquitoes and other insects in the home vicinities.—Thirty-nine of the cases were at homes within 100 yards, 13 were at homes 100 to 200 yards, 16 were at homes 200 to 500 yards, 12 were at homes 500 to 1,000 yards, and 19 were at homes over 1,000 yards from such water.

Meals away from home.—Forty-one of the 99 cases were in persons who occasionally or frequently ate meals away from home. No evidence was obtained that any one eating place away from home had served meals to more than one of these persons.

Milk and milk products.—Eighty-five patients gave histories of having used milk habitually as a beverage, nine of having used no fresh milk in any way, and one of having used it only on fruits or cereals. For four the milk history was not obtained.

The milk used was from home or neighbors' cows for all except 16. For these 16 milk was purchased from public dairies. Only 7 used pasteurized milk. Except in the 3 instances of 2 cases to a home, no 2 cases were in persons who used milk from any one source.

Eighteen persons had eaten market-bought butter, 20 had eaten market-bought cheese, and 37 had eaten marketed ice cream. The sources of these purchased milk products were many and there was no evidence that any of them could have been a common denominator for any 3 or more cases.

Eggs.—Histories regarding the eating of eggs were obtained for 94 cases; 51 were in persons who ate only home-produced eggs, 25 in those who ate market-bought eggs, and 18 in those who ate none. There was no evidence that eggs bought at any one market served as a common denominator.

Raw fruits and vegetables.—Among the persons who were afflicted with the disease, 52 ate tomatoes, 41 ate peaches, 16 ate lettuce, 6 ate pears, 11 ate apples, 6 ate oranges, 7 ate bananas, 3 ate grapes, 3 ate cabbage, 4 ate berries, 1 ate carrots, and 3 ate plums. Most of these foods were produced and consumed at individual homes. There was no evidence that any purchased might have been a common denominator to a considerable number of the cases.

Water supplies.—Sixty-five of the cases were in persons who used water supplies solely or principally from sources which on inspection were regarded as sanitary. These sources included public piped supplies for 27, bored wells with pumps for 28, cement cisterns for 5, and artesian wells for 5. The water used solely, principally, or occasionally by the persons who had the other 34 cases came from sources obviously exposed to contamination. These sources were

mainly shallow open dug wells with buckets, along with a few springs and a few cisterns equipped with buckets instead of pumps.

No definite evidence was obtained suggesting that the water supplies were a source of the infection. The fact that about two-thirds of the cases were in persons who were not exposed to drinking water certainly or probably contaminated is impressive. The sanitary average of the water supplies used by the persons who had poliomyelitis is estimated to have exceeded that of the water supplies used by the total population of the State.

Excreta disposal.—Thirty-six of the patients had at their homes sanitary excreta disposal systems consisting of water closets connected with public sewerage systems or well-constructed and apparently well-maintained pit privies.

The other 63 patients had at their homes more or less grossly insanitary excreta disposal systems. The majority of these systems consisted of poorly maintained open-back surface privies and the others of resort to nearby barns, stables, woods, or fields in lieu of toilets of any kind.

The finding with respect to excreta disposal, of course, might be considered as evidence of a spread of the poliomyelitis infection from the insanitary deposits of human excreta. However, it is estimated from all of the definite data available that the average of sanitary excreta disposal at the homes affected with poliomyelitis was at least equal to that for the State as a whole.

Mice.—Because of the evidence that mice are a harborage of the causative virus of choriomeningitis of persons and of the frequency of a poliomyelitis-like infection in mice generally, especially in the young, and the clinical suggestion that some of the cases reported as abortive or nonparalytic poliomyelitis in Mississippi in 1941 were cases of choriomeningitis, especial care was exercised to obtain accurate and complete evidence of mouse infestation of the homes visited.

There were no mice at the homes with 24 of the cases, few mice occasionally at the homes with 52 of the cases, and many mice usually at the homes with 23 of the cases.

Rats.—At the homes with 64 of the cases, rats were many and frequent; at the homes of 27 of the cases, rats were few and occasional, and at the homes with 8 of the cases, the families stated no rats had been observed on the premises recently and inspection of the premises, including outhouses, if any, revealed no evidence of recent rat infestation.

The difference found between rat infestation and mouse infestation at the affected homes was striking. It was not so great, however, as that found in Louisville, Ky., during the outbreak of poliomyelitis in that city in the summer and autumn of 1935 (*6*).

Especial care was exercised to obtain accurate evidence of the presence or the absence of rat infestation at the homes visited. One reason for doing so was because of the view held by some of the long-time students of the problem, including Mark Richardson and Charles Brues (7) of Massachusetts, that rats may be the main harborage for poliomyelitis infection.

Of the eight cases at homes without a history of and without objective evidence of recent rat infestation, the diagnoses were doubtful for five, the infection probably was contracted outside Mississippi (in Alabama) in one, and two were in persons who probably contracted the infection while on visits away from home in a localized area in Yazoo City, Miss., where poliomyelitis was prevalent at the time. Thus rat infestation was practically universal at the homes in which the cases of poliomyelitis occurred.

There are no satisfactory data upon which to base an estimate of rat infestation at homes throughout the entire State. It may vary considerably in different areas. Rat surveys of outbreak areas and of nonoutbreak areas might prove worth while in future state-wide studies of poliomyelitis.

Rats appeared to be sufficiently conspicuous in the poliomyelitis situation in Mississippi in 1941 and also as was noted in a concurrent situation of high intensity in Walker County, Ala., to be considered and studied thoroughly as a possible animal reservoir of poliomyelitis infection.

Personal contact.—In Mississippi during the period covered by the study only three instances were reported of more than one case in a home. In each there were two cases to a home.

In the first, the onsets of the two cases were within 24 hours of each other, one on October 1, the other on October 2. In the family were the father, mother, and four children aged 9, 5, 2 years, and 8 months. The two cases were in the children aged 9 and 2 years. Both had fair complexions; the two who escaped poliomyelitis had dark complexions. The 9-year-old child and the baby had had dysentery during the summer. The home, with good sanitary and hygienic conditions, is located in the western outskirts of the city of Hattiesburg, with surroundings more rural than urban in character. Within a hundred yards down hill from the dwelling is a large polluted creek which runs from east to west through the main part of the city. Rats and mosquitoes were abundant in the immediate vicinity of the home. Except for these two cases, no others were reported in Hattiesburg.

In the second instance, the onsets of the two cases were 6 days apart, one on July 23 and one on July 29. In the family were the father, mother, and 5 children aged 9, 8, 6, 4, and 3 years. The children aged 6 and 4 years had poliomyelitis; the 9-year-old child had vague systemic symptoms, beginning July 28 and continuing for 2 or 3 days,

which may have been due to poliomyelitis infection. The home was isolated, located on a large plantation, and was very primitive in character. Rats, mosquitoes, and stable flies were abundant in and around the dwelling. Dead sparrows were found in the yard 10 to 15 days before the onsets of the cases.

In the third instance, the onsets of the two cases were 8 days apart, one on July 15 and one on July 23, in the city of Pascagoula. It will be discussed in detail in a subsequent section of this report.

Except for these instances of two cases to a home, no evidence of direct personal contact between definite clinical cases was found in the State. In one case there was a history of indirect personal contact. A woman living in the household of a child affected with the disease worked in a doctor's office and there had had contact with two or three children with poliomyelitis during the several weeks before the onset of the case in her household.

As was to be expected, histories of contact with persons having some sort of illness were obtained for a number of the cases. Fifty-one of the cases, however, were in households in which there was no history of illness of any kind in other members of the household within 3 months before or a month or more after the onset of the case of poliomyelitis. In the households affected, there were, besides the persons with the cases of poliomyelitis, a total of 211 children under 15 years of age. Besides the definite cases, there were in these households 10 cases which seemed quite probably abortive cases of poliomyelitis. Since other observers have placed so much emphasis on the probability or possibility of a zone of abortive cases around every definite clinical case, the histories of cases of illness, besides those of reported poliomyelitis obtained in the 96 homes covered in detail by this study, are given in table 3.

It is possible that a large number of these cases of illness were abortive poliomyelitis, but from the detailed histories obtained from the families and from statements obtained from the attending physicians, if any, only 10 of them appeared quite probably to have been abortive or nonparalytic poliomyelitis.

Eight of the definite cases were in persons who had been in contact at their homes, within 1 to 30 days prior to onset, with visitors who had come from outside vicinities in which poliomyelitis was more or less prevalent.

Ten persons were possibly infected through personal contact or otherwise while visiting outside their home neighborhoods in vicinities where poliomyelitis was more or less prevalent.

TABLE 3.—*Illnesses in homes with cases of poliomyelitis*

Case	Relationship to patient with poliomyelitis and age of person	Illness	Within 3 months before, a month or more after, or concurrent with onset of case of poliomyelitis		
			Before	After	Concurrent
1	Uncle, 18 yrs	Severe boils	x	x	x
2	Sister, 9 yrs	do			x
3	Mother	Diarrhea		x	
	Brother, 4 yrs	Acute coryza		x	
	Sister, 18 mos	do		x	
4	Brother, 8 mos	Dysentery	x		
5	do	do	x		
6	Mother	Acute coryza	x		
	Sister, 10 mos	do	x		
7	Mother	Tonsillitis	x		
8	Brother, 13 yrs	Acute articular rheumatism	x		x
9	Mother	Influenza		x	
10	Brother, 15 yrs	Sore throat		x	
11	First cousin, 2 yrs	Acute coryza		x	
12	Mother and father	Malaria	x		
13	Sister, 13 yrs	do		x	
14	Brother, 7 yrs	German measles	x		
		Acute coryza		x	
15	Mother	Bilious attack	x		
16	Brother, 2 yrs	Diarrhea			x
	Brother, 8 mos	Acute coryza			x
17	Brother, 15 yrs	Sore throat	x		
	Sister, 14 yrs	do	x		
18	Father	Malaria	x		
	Brother, 5 yrs	do	x		
19	Brother, 4 yrs	Fever for 3 days			x
20	Sister, 12 yrs	Measles	x		
21	Sister, 13 yrs	Acute coryza		x	
22	Brother, 3 yrs	Measles and diarrhea			x
23	Grandfather	Malaria	x	x	
24	Brother, 3 yrs	Sore throat	x		
25	Brothers, 2 and 3 yrs	Malaria	x		
26	Brother, 19 mos	Boils and acute coryza			x
27	Brother, 13 yrs	Tonsillitis		x	
28	Brother, 8 yrs	Headache and fever for 3 days	x		
29	Brother, 7 yrs	Fever for 1 day		x	
30	4 brothers	Mumps	x		
31	3 others under 10 yrs	Slight fever for 6 days		x	x
32	Father	Malaria		x	
	Brother, 17 yrs	Chills		x	
33	2 under 10 yrs	Malaria		x	
34	Father	Upset stomach (1 day)	x		
35	do	Acute coryza	x		
36	Brother, 13 yrs	Mumps	x		
	Brother, 11 yrs	Amebic dysentery	x		
37	Mother	Chills	x		
38	Brother, 10 yrs	Sore throat			x
	Sister, 6 yrs	Fever and vomiting		x	
39	Father	Malaria		x	
	Sister, 16 yrs	do		x	
40	Sister, 18 mos	Diarrhea		x	
41	Brother, 8 yrs	Dysentery	x		
	Sister, 5 yrs	do	x		
42	Sister, 7 yrs	Colitis	x		
43	Mother	Influenza	x		
44	2 sisters, 11 and 5 yrs	Acute coryza	x		
	Sister, 6 mos	Dysentery	x		x
45	Brother, 6 yrs	Headache and fever		x	
	Father	Erysipelas			x
	Mother and 3 brothers, 9, 6 and 3 yrs.	Acute coryza			x

LOCALIZED SITUATIONS OF SPECIAL INTEREST

In the course of the state-wide study a number of localized situations of special interest were found. Some of them are discussed sketchily herein.

Yazoo County.—The area of Yazoo County is about one-half flat delta and the remainder hilly, largely wooded region. The popula-

tion in 1940 was 40,091 with 13,832 white, 26,232 Negro, and 27 of other races.

The cases of poliomyelitis in the county outside Yazoo City in 1941, by dates of onset, race, sex, and age were as follows:

Case No.	Date of onset	Race	Sex	Age, in years	Case No.	Date of onset	Race	Sex	Age, in years
1	May 28	N	M	14	8	July 18	W	M	9
2	June 1	N	M	4	9	July 21	W	F	3
3	June 5	N	M	16	10	Aug. 4	N	M	6
4	June 15	N	M	2½	11	Aug. 5	N	F	4
5	June 16	N	M	2½	12	Aug. 18	N	M	2
6	June 26	W	F	18	13	Aug. 21	N	F	15
7	July 12	N	M	4	14	Aug. 28	N	M	1¼

The first two cases found and reported were at homes about 3 miles apart in the southwestern corner of the county about 15 miles from and down the Yazoo River from Yazoo City. Cases 4, 5, 7, and 9 were at homes some miles apart in the Yazoo Valley between the homes with cases 1 and 2 and Yazoo City. Case 14 was at a home in the northern outskirts of Yazoo City. The other cases were at homes widely scattered through the eastern two-thirds of the county. There was only one case (No. 7) at a home west of the Yazoo River. It is estimated that about one-fifth of the rural population of the county is in the area west of the river. Cases 6, 9, and 13 were in persons who had been on visits to an infected area in Yazoo City and may have contracted the infection there.

There was no trace of any direct association between any two of the affected families. The majority of the cases were at isolated homes in children who during the 30 days prior to onset of illness had not been away from their immediate home vicinities and had had very little direct or indirect contact with the outside world. The contact with persons outside the immediate home vicinity usually was indirect through a visit of some older member of the family to some town for a few hours once every week or two.

Eight of the 10 cases reported in the neighboring county of Holmes were at homes located in the southwestern third of the county's area, adjacent to Yazoo County.

Yazoo City.—This city, with a population (in 1940) of 7,258, including 3,385 whites and 3,868 Negroes, and 5 of other races, is located on the eastern bank of the Yazoo River. The western third of the city area is low and flat and the remainder is hilly with the hills rising rather abruptly from the low river valley section. There is no congestion of population except in two Negro sections.

The cases of definite clinical poliomyelitis reported in Yazoo City in 1941, by dates of onset, race, sex, and age, were as follows:

Case No.	Date of onset	Race	Sex	Age, in years
1	July 1	W	M	3
2	July 14	W	F	11
3	Aug. 3	W	M	7
4	Aug. 6	W	F	2

In addition to these definite cases, five or six concurrent cases of probably abortive poliomyelitis were found in the city, all among white children. All of the cases, the definite ones and those probably abortive, were at homes in one limited area five short blocks long, and two blocks wide.

Case 1 was at a home facing west on Mound Street within a few yards south of Powell Street in the low flat western part of the city. Directly across Mound Street from the home was a large weedy lot containing much rubbish. At the far side of the weedy lot were a cotton compress and a railway track and a freight yard, where freight cars carrying livestock, grains, and so forth often were shifted back and forth. Across the railway track was a congested Negro quarter of unhygienic character. A drainage creek, in which mosquitoes were breeding in large number, was about 150 yards from the front of the dwelling. Directly across Powell Street was a large pasture in which horses and cows were grazed. The whole vicinity was heavily infested with rats, English sparrows, mosquitoes, stableflies, fleas, and other insects. The father and mother ran a restaurant about two blocks from the residence. The restaurant was in one of the heavily rat-infested areas of the city. The boy spent much of his time at the restaurant. His aunt, who lived in the home with him, worked in a doctor's office and there, within the 30 days before the onset of the boy's case, had been associated with two or three children brought in from the surrounding country for treatment for poliomyelitis. Thus it was evident that in this case the infection may have been contracted in any one of several ways.

Case 2 was at a home with excellent hygienic conditions and with good surroundings. Rats, however, were noted from time to time in the basement and the attic of the dwelling, and one block east was the beginning of an unhygienic, congested Negro quarter. This home was located on Powell Street east and up a hill five blocks from the corner of Mound and Powell Streets.

Case 3 was at a home on Powell Street across a street and one-half block downhill from the home with case 2. In the family were the father, mother, and the one child. The dwelling was of good construction and generally hygienic but rats and various insects were numerous on the immediate premises.

Case 4 was at a home on College Street, one block north, across a street and on a line running from south due north from the home with

case 2. This section of College Street is famed for large families with small children. The family with this case consisted of the father, mother, and four children aged 9, 6, 3, and 2 years. The 6-year-old brother of the patient with definite poliomyelitis developed, about 1 week after the onset of the definite case, a fever which continued for 3 or 4 days without any other objective symptoms. This, of course, may have been an abortive case of poliomyelitis.

There was no traceable personal association of any kind among these four families. No two of them were, through any of their members, acquainted with each other. Searching and repeated inquiries were made to discover any possible direct association between any two of them. The only possible personal contact factor found was a postman who delivered mail to all four of the homes. This postman lived in a home next door to the home with case 1, and there his wife ran a beauty parlor. He delivered mail not only in the affected area of 8 or 10 blocks, but also to 20 or 30 other blocks in which no case of poliomyelitis was found.

Case 6 of the Yazoo County series spent about 4 hours at the beauty parlor on Mound Street next door to the home with case 1 of the city series 12 days before the onset of her severe case of poliomyelitis. Two of the other Yazoo County cases and a case in Holmes County were in persons who visited nearby the home with case 1 within 5 to 15 days before the onsets of their illness. An 8-year-old boy in a home on Mound Street one-half block south from the home with case 1 developed, about 1 week after the onset of the first case, a febrile condition which continued for 5 or 6 days and which probably was a case of abortive poliomyelitis. Case 14 of the county series lived about 1 mile north from the home with city case 1. Thus it appears that there was a definite focus of infection in this localized vicinity.

Much excitement and publicity resulted from the outbreak in Yazoo City. The physicians and a highly efficient county-city health department were thoroughly vigilant, but not a case of definite clinical poliomyelitis was found anywhere in the city outside the limited area in which the 4 reported cases occurred. A house-to-house canvass was conducted by the health department in October, covering the 10 blocks comprising the area of incidence and 6 other blocks in other parts of the city, to obtain histories of all illness since June 1. In addition to the cases already known, 3 or 4 cases which quite probably were abortive poliomyelitis were found. All were in white persons residing in the area of incidence of the known definite cases.

No connection through food supplies was found except the eating of ice cream by two of the children at the same drug store. The distribution of water mains was such that no one main reached the four affected homes. All four of the homes, however, were on sewer lines discharging into one main sewer running down Powell Street. There

is a drainage ditch much frequented by rats and sparrows within 200 yards of each of the four homes. The prevailing wind is from the southwest. Mosquitoes are reported to have been unusually prevalent in Yazoo City in the summer of 1941.

This small outbreak in Yazoo City at first appears different from the concurrent intensive outbreak in Cordova in Walker County, Ala. On analysis, however, the difference seems to have been of degree rather than of kind.

Jackson.—In this city, the largest of the State, with a population of over 62,000, four cases were reported and retained on the official records as poliomyelitis for the period January 1 to December 1, 1941. One of these, terminating fatally, was a Negro girl whose onset of illness was in January. Subsequent to the original diagnosis and report by one physician, she was attended by two others who definitely diagnosed her case and gave as the cause of death in the death certificate acute articular rheumatism with endocarditis. Another case with onset of illness in August was in a tramp Negro boy who for 2 or 3 days had vague indefinite symptoms without paralysis. These two cases were eliminated for epidemiological purposes.

The two other cases were in white families of good economic status living in homes about 2 miles apart in recently developed residential sections. One of these cases, definitely paralytic, was in a baby 10 months of age; the other, diagnosed as a nonparalytic case, was in a boy 3 years of age. The onset of the first was on August 1, and that of the second was on September 25. There was no known association between the two families. Rats, *stomoxys calcitrans*, and mosquitoes were very abundant in each of the home vicinities.

Pascagoula.—The only cases reported in this city were two in one white family living under fairly good economic circumstances. The family consisted of the father, aged 27 years, the mother, aged 24 years, and the daughter, aged 3 years. The daughter had onset of paralytic poliomyelitis on July 15, and the father on July 23. A roomer in the house went to Jefferson County, Ala., and from that county, where poliomyelitis was prevalent at the time, brought his bride to this home 2 weeks before the onset of the case in this home. The bride at the time of arrival had a slight cold and a sore throat. This seemed at first an impressive instance of conveyance of poliomyelitis infection through personal contact—from the bride to the child in the home and from the child to the father. Two other cases, however, developed—one with onset on September 28, and the other with onset on October 10—in children living in different parts of Jackson County outside Pascagoula. Each of these children, whose families were unknown and unrelated to each other, had grandparents whom they visited every day or two living within one block of the

home with the two city cases. This subsequent development raises a question as to whether this was an instance of conveyance of infection by person or by place. The vicinity was heavily infested with rats and mosquitoes.

Starkville.—A family consisting of the father, mother, and six children under 10 years of age, in poor economic circumstances, moved on June 27, 1941, from Montgomery County, Ala., to a house in a very insanitary section of a cotton-mill village in an outskirt of Starkville. The baby boy, aged 10 months, developed upset stomach and diarrhea a few days before they arrived in Starkville. A day or two after his arrival in Starkville, he developed paralysis. He had what appeared to be in all respects a definite clinical case of poliomyelitis. A large number of children from all over the mill village, with a population of about 1,000, were in close contact with him and his brothers and sisters. Though a close watch was kept by the mill company doctor, and by the local health officer, not another case even remotely suggesting poliomyelitis developed among any of the other persons living in the mill village. The insanitary conditions and the association of many children with the afflicted child were comparable to the situation in the area worst affected in Cordova, Ala. Measles developed in all six of the children in the family with the case of poliomyelitis about 1 week after their arrival in Starkville. From them it spread widely throughout the mill village.

CONCLUSIONS

1. The findings from this study have epidemiological significance.

2. The preponderance of the epidemiological evidence is that in Mississippi in 1941 poliomyelitis infection was spread mainly not by personal contact but by unknown factors. These factors perhaps included rats, birds, domestic fowls, or bovines as harborage, and houseflies (*Musca domestica*), stable flies (*Stomoxys calcitrans*), blowflies, mosquitoes, fleas, or other insects as vectors, and tended to operate with striking localization. On the whole a picture was presented of spread of infection by place rather than by person.

3. Epidemiological studies of this kind on a large scale, covering different neighboring communities and also widely separated regions, combined with duly directed, coordinated, and concentrated laboratory research work, would go far, probably all the way, within a reasonable period of time, toward solution of the problem of the causation of poliomyelitis.

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FIVE FUMIGANTS FOR DISINFESTATION OF BEDDING AND CLOTHING: A COMPARATIVE STUDY OF INSECTICIDAL PROPERTIES

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Fumigation has been defined as the process of liberating fumes or gases with the object of destroying insects, rats, mice, and other small animals acting as vectors of infection. In view of the present potentialities for the spread of disease during the congregation of military and civilian populations, it has seemed timely and appropriate to re-examine the properties of some of the principal fumigants and determine these properties under test conditions. It may be, too, that there will be an increasing need for the extensive use of fumigants in disinfesting fabrics and clothing coming into the United States from infected foreign territory.

In this study attention was directed to a consideration of the effectiveness of several fumigants when used to destroy insects in clothing and bedding. The chemicals chosen were those which have shown evidence of value as insecticides and have been used with reported success by public health workers.

Fumigants tested.—The fumigants tested were hydrocyanic acid, chloropicrin, methyl bromide, ethylene oxide-carbon dioxide mixture in the proportion of one part ethylene oxide to nine parts carbon dioxide, and ethylene dichloride-carbon tetrachloride mixture in the proportion of three parts ethylene dichloride to one part carbon tetrachloride.

Points considered.—In testing each of the fumigants the following points were observed:

1. Minimum lethal concentration (MLC) for insects and rats.
2. Penetration of fabrics.
3. Time exposure required for killing.
4. Safety features.
5. Effect upon fabrics.
6. Temperature as it affected insecticidal qualities.
7. Methods of application.

Mechanical equipment.—The tests were conducted under laboratory conditions in a gas-tight steel chamber having a capacity of 11.037 cubic feet and provided with special inlets permitting the introduction of accurate quantities of the fumigant studied. Provision was made for obtaining a vacuum of 25 inches or more of mercury.

Experimental conditions.—In the tests for penetrating qualities, insects were placed between layers of blanket material folded in such manner that the gas would have to penetrate each separate layer before reaching the insects. The material was of a thin cotton-wool mixture averaging 16 layers to the inch when compressed by a pressure of ⅛ pound to the square inch of surface.

Vermin used.—The insects used in determining the efficiency of the fumigants were bedbugs (*Cimex lectularius*) and cockroaches (*Blattella germanica*). The wild rats were of the Norvegicus species. These particular vermin were chosen because of their reputed resistance to fumigants. In preliminary tests it was noted that bedbugs, in varying stages of development, exhibited no demonstrable difference in resistance when exposed to the fumigants. However, only those past the third molt were used. In the case of cockroaches the adults appeared to be more resistant than the young and for that reason only adults were used. A considerable variation in the resistance of individual bedbugs and cockroaches was noted, the greatest variation being found with hydrocyanic acid and the least with chloropicrin.

The results obtained in laboratory tests with the fumigants under stated conditions are shown in tables 1, 2, and 3.

TABLE 1.—*The minimum lethal concentration and the concentration for a 100 percent kill of bedbugs by each of five fumigants, in ounces per 1,000 cubic feet, under comparable conditions*

Fumigant	MLC for bedbugs in oz. per 1,000 cu. ft.			Hours of exposure	Fahrenheit temperature range	Concentration required for a 100 percent kill of bedbugs in oz. per 1,000 cu. ft.		
	Unprotected	Protected by 32 layers of blanket				Unprotected	Protected by 32 layers of blanket	
		Atmospheric pressure	25-inch vacuum				Atmospheric pressure	25-inch vacuum
Hydrocyanic acid	⅛	½	⅛	4	61° to 70°	2	4	2
Chloropicrin	3	4	4	4	65° to 72°	4	6	4
Methyl bromide	4	6	4	4	70° to 72°	6	8	6
Ethylene oxide mixture.	80 at 85°	128 at 85°	80	4	80° to 85°	192	256	192
Ethylene dichloride mixture.	88	192	128	4	70° to 75°	160	224	160

TABLE 2.—*The minimum lethal concentration and the concentration for a 100 percent kill of cockroaches by each of five fumigants, in ounces per 1,000 cubic feet, under comparable conditions*

Fumigant	MLC for cockroaches in oz. per 1,000 cu. ft.			Hours of exposure	Fahrenheit temperature range	Concentration required for a 100 percent kill of cockroaches in oz. per 1,000 cu. ft.		
	Unprotected	Protected by 32 layers of blanket				Unprotected	Protected by 32 layers of blanket	
		Atmospheric pressure	25-inch vacuum				Atmospheric pressure	25-inch vacuum
Hydrocyanic acid	⅛	½	⅛	4	60°	2	6	2
Chloropicrin	3	4	3	4	65° to 76°	5	6	6
Methyl bromide	3	6	3	4	69° to 72°	5	8	5
Ethylene oxide mixture.	80	128	80	4	79° to 85°	160	512	160
Ethylene dichloride mixture.	48	64	48	4	63° to 70°	88	160	88

TABLE 3.—*The minimum lethal concentration of 5 fumigants, in ounces per 1,000 cubic feet, for the destruction of wild rats, under comparable conditions*

Fumigant	MLC for rats in ounces per 1,000 cubic feet (unprotected)	Hours of exposure	Fahrenheit temperature range
Hydrocyanic acid	⅛	4	52° to 59°.
Chloropicrin	1	4	63°.
Methyl bromide	2	4	76° to 79°.
Ethylene oxide mixture	80	4	80°.
Ethylene dichloride mixture	88	4	73°.

To obtain the data shown in the tables, 139 tests were made. These ranged from a sublethal dosage with various conditions of exposure, temperature, and protection, to the maximum dosage necessary to produce a 100 percent kill. In comparing the fumigants the period of exposure to which the insects and rats were subjected was set at 4 hours, for preliminary tests had shown that the reduced toxicity of some of the fumigants (ethylene oxide and ethylene dichloride mixtures) when applied for less than 4 hours could not be compensated by a proportionate increase in concentration. Quick action is of prime importance and a fumigant which is not capable of producing satisfactory results within 4 hours will be of restricted value. To the limit of 12 hours the effectiveness of all the fumigants was found to be in direct proportion to the period of exposure. No tests were made beyond that exposure period.

A comparison of the five fumigants led to the following observations:

1. The minimum lethal dosage of each fumigant shows no marked difference between bedbugs and cockroaches. The exposure of wild rats was made because it was believed that these animals would more nearly approximate human beings than insects in reaction to toxic gases. It will be noted that the greatest variation in the MLC between rats and the insects tested was found in the case of chloro-

picrin. This is probably due to the irritating effect of the chloropicrin on the delicate lung tissue of rats, superimposed upon the purely toxic effect.

2. The tests indicated that the penetrating qualities of the fumigants followed very closely their molecular weights. Hydrocyanic acid and ethylene oxide-carbon dioxide mixture are the least penetrating to fabrics, having molecular weights of 27, 44, 44, respectively. All the fumigants penetrated 32 layers of thin blanket material composed of a mixture of cotton and wool in a 4-hour exposure at atmospheric pressure. Chloropicrin appeared to penetrate fabrics more readily than any of the other fumigants. When a vacuum was not used, time was the essential factor in the penetration of fabrics by all gases. When a vacuum of 25 inches or more was used, penetration of 32 blanket layers was accomplished by all the fumigants. In this connection a series of tests was made with chloropicrin, using a commercial steel fumigating chamber of 2,500 cubic feet capacity. A complete kill of both bedbugs and cockroaches was obtained within the center of a commercial bale of cotton, the concentration being 16 ounces per 1,000 cubic feet, with a 4-hour exposure and a 28-inch vacuum. Following a technique described in a United States Department of Agriculture publication,[1] the insects were placed in a hole drilled through the point of a long iron pin, which was then driven into the center of a bale of cotton by means of a sledge. Controls similarly placed but unexposed to gas were not injured.

3. *Toxicity.*—In proportion to its concentration, hydrocyanic acid appeared to be the most toxic of the fumigants tested, although the spread between the minimum lethal concentration needed to produce a 100 percent kill of bedbugs and cockroaches was very much greater than was found to be the case with the other fumigants tested. Chloropicrin and methyl bromide also gave a satisfactory kill within the 4-hour period of exposure. With ethylene oxide and ethylene dichloride mixtures a longer exposure was needed to obtain the full toxic effects under all conditions.

Delayed effects.—In observing the latent effect of the various fumigants on wild rats it was noted that when exposed to hydrocyanic acid they either died during or immediately after exposure or made a complete recovery, indicating that no delayed toxic effect resulted from exposure to the gas. With chloropicrin, when death of the animal did not occur during or immediately after exposure to a dosage approximating the MLC, symptoms of pulmonary irritation which lasted for several days were frequently observed. Rats recovering from such symptoms were observed for a period of 14 months during which period they appeared normal in all respects.

Following the exposure of rats to a MLC of methyl bromide, death was frequently delayed for a period of 1 to 3 days, with an occasional death much later. When recovery occurred, toxic symptoms persisted for a long time. Cockroaches and bedbugs exhibited the same delayed or prolonged toxic symptoms when subjected to a concentration of the gas considerably exceeding the MLC.

Rats exposed to ethylene oxide and ethylene dichloride mixtures in concentrations slightly less than the lethal dosage showed evidence of a delayed toxic effect by such symptoms as refusal to eat, inactivity, ruffed fur, unsteady gait, and a slow recovery extending over several weeks.

4. *Safety.*—Since the safety of a fumigant frequently depends upon the ease with which it can be detected by the human senses, this quality of the fumigants was closely observed. Chloropicrin was the outstanding gas in this respect, a concentration of one-sixteenth of the MLC being unbearable to humans because of its intense lachrymatory irritation. In its gaseous form this is believed to be the safest of all the fumigants tested, although the fumigator is subjected to the

[1] Technical Bulletin No. 63, U. S. Department of Agriculture.

hazard of severe skin burns when handling chloropicrin in liquid form unless protected by rubber gloves. The fumigant presents no explosive or fire hazards.

Methyl bromide, highly toxic in its effects, has only a slight odor suggesting bromine and it is very difficult to estimate the gaseous concentration by the sense of taste or smell. Rats exposed to sublethal concentrations of the gas frequently exhibited no symptoms during the period of exposure but evidenced toxic symptoms 24 hours later as shown by reduced activity and refusal to eat. No irritation to the eyes was noted in minimum lethal concentrations. For these reasons it is considered particularly dangerous.

Neither ethylene oxide mixture nor ethylene dichloride mixture has sufficient warning qualities by which it may be readily detected by other than experienced fumigators. Frequent exposure of fumigators to sublethal concentration of these gases during the process of aeration may produce a cumulative toxic effect.

5. *Effect on fabrics.*—None of the fumigants in gaseous form were found to affect the color or texture of fabrics or noticeably to corrode metals. Samples of various textiles of both vegetable and animal origin were subjected to large quantities of the fumigants in gaseous form without any deterioration being noted.

6. *Temperature.*—A low temperature was found to alter materially the efficiency of two of the fumigants, ethylene oxide and ethylene dichloride mixtures. For these fumigants a temperature of 80° F. or more was required to obtain a maximum result, although fair results could be obtained at temperatures as low as 65° F. Below the latter temperature ethylene oxide mixture was unsatisfactory. Ethylene dichloride mixture was found effective as low as 57° F. with only a moderate increase of dosage.

7. All of the fumigants mentioned may be obtained commercially in liquid form in steel cylinders from which they may be sprayed into fumigating chambers or compartments, under their own pressure or that of compressed air. With hydrocyanic acid and chloropicrin this method may be altered by distributing, from sealed cans, impregnated absorbent disks containing the liquid gas. These cans are light in weight, easily opened, and contain from 1 to 4 pounds of liquid gas, each disk representing about ¼ ounce.

The application of methyl bromide and ethylene oxide and ethylene dichloride mixtures requires the transportation and use of heavy, cumbersome steel containers equipped with pressure gages, gas-tight valves, sprays, hose, etc., together with scales for weighing proper quantities for small chambers or compartments. With hydrocyanic acid and chloropicrin all this equipment may be dispensed with by the use of can type containers, thus resolving the problem into one of comparatively easy transportation and simple application.

When the transportation of heavy apparatus or explosive gas presents a major problem in the disinfestation of bedding and clothing of the civil population or of the armed forces, it would appear that chloropicrin is the fumigant of choice. The exercise of a little ingenuity in converting small empty buildings, packing boxes, trash cans, tents, canvas bags, etc., into fumigating devices should permit the use of chloropicrin as a disinfestation agent under conditions which might otherwise be considered adverse.

CONCLUSIONS

The choice of a fumigant will depend upon location, time, space, equipment, transportation, quality, quantity, use to which the fumigated material is put, presence of trained operators, safety features, and the kind of insects to be eradicated. When so many factors must be taken into consideration, a comparison of the value of the

fumigants tested is difficult and the results may vary somewhat according to individual judgment.

None of the fumigants tested were found to be ideal in every respect, and no single fumigant was superior under all conditions. However, in connection with bedding, clothing, and like textiles, it is believed that hydrocyanic acid and chloropicrin are the fumigants of choice. As an insecticide, chloropicrin appeared to have the most desirable qualities. It is nonexplosive and has excellent warning characteristics in sublethal concentration. Rats exposed to slightly less than lethal concentration for a period of 4 hours show no evidence of permanent pathology. The objection to this gas is mostly concerned with the necessity for ventilation following fumigation. It clings persistently to fabrics, requiring either prolonged aeration, agitation, heating, mechanical ventilation, or some combination of these factors. Unless used in an isolated building, its irritating properties necessitate an exhaust extending above the surrounding buildings. None of these objections are so serious as not to be easily overcome in a commercial fumigating vault located in large centers of population or by isolating the fumigation chamber in field disinfestation of bedding and clothing.

It would appear that chloropicrin has considerable possibilities as a delousing agent for clothing especially when war conditions require such treatment on a large scale and when suitable apparatus for the application of steam heat is not available. Moore [2] and Moore and Herschfelder [3] report the destruction of both lice and eggs in 30-minute exposures using a concentration of 4 cc. to a cubic foot of space. The same results should be obtainable by greatly reduced concentration if the exposure were increased to a 4-hour period. The writer was able to obtain satisfactory kill of the eggs of bedbugs in a concentration of 12 ounces per 1,000 cubic feet of space with a 4-hour exposure.

From a toxic standpoint, methyl bromide is an excellent fumigant for bedbugs and cockroaches. It is nonexplosive and presents no fire hazard but shows evidence of a delayed toxic effect in sublethal concentration. It is not readily detected by the senses of smell and taste. In comparatively weak concentration a toxic quantity may be inhaled without the victim being aware of exposure.

Ethylene oxide-carbon dioxide mixture proved effective as an insecticide when the test subjects were exposed to the full concentration of gas, but is somewhat deficient in penetrating qualities and requires prolonged exposure to produce results.

In comparing the relative toxicity of the ethylene oxide and ethylene dichloride mixtures, the kind of insects tested must be considered. A small percentage of both bedbugs and cockroaches proved to be extremely resistant to ethylene oxide mixture, necessitating a high

[2] Moore, Wm.: J. Lab. and Clin. Med., 3:261-268 (1918).

[3] Moore, Wm., and Herschfelder, A. D.: Univ. of Minn. Research Pub., Vol. 8, No. 4, July 1919 (86 pages).

concentration of the gas in order to secure a 100 percent kill. On the other hand, a small percentage of bedbugs appeared quite susceptible to this gas. For cockroaches ethylene dichloride mixture appeared definitely more toxic than the ethylene oxide mixture. At temperatures below 65° F. the ethylene dichloride mixture was more effective than the ethylene oxide mixture. The low toxicity of both these gases coupled with the high concentration necessary in order to obtain a satisfactory kill of insects are undesirable features when large quantities of bedding and upholstery are to be fumigated.

No new data relative to the value of hydrocyanic acid gas were developed by these tests. In the absence of a vacuum this gas did not penetrate fabrics quite as readily as chloropicrin or methyl bromide. The absence of definite warning qualities in lethal concentrations renders it dangerous to life when used by inexperienced persons. However, its high toxicity, rapid evolution from a liquid to a gaseous state, coupled with the fact that the gas approximates the weight of air and thereby promotes rapid diffusion, makes it a valuable fumigant for eradicating rodents and insects from buildings and their furnishings.

Tests other than those mentioned indicate that in the case of hydrocyanic acid the residue gas remaining in fabrics following fumigation is much greater than formerly believed. Absorption and adsorption appear to play an important role in the ability of a fumigant to penetrate fabrics.

It is suggested that in addition to the processes of absorption and adsorption there may be a reverse chemical reaction between certain gaseous fumigants and fabrics derived from both animal and vegetable fibres, which may account for a portion of retained gas.

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PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

March 29–April 25, 1942

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the PUBLIC HEALTH REPORTS under the section "Preva-

lence of disease." The table gives the number of cases of these diseases for the 4-week period ended April 25, 1942, the number reported for the corresponding period in 1941, and the median number for the years 1937–41.

DISEASES ABOVE MEDIAN PREVALENCE

Measles.—While the number of cases (96,465) of measles was only about 45 percent of the number reported during this period in 1941, it was about 1.6 times the 1937–41 average incidence for the period. Each section of the country except the Middle Atlantic contributed to the excess over the normal seasonal expectancy, but the greatest excess was reported in the Pacific region; there the number of cases was more than 8 times the 1937–41 average incidence. Minor increases were reported from the other regions and in the Middle Atlantic region a decrease of about 45 percent was reported. During this period in 1941 the disease was most prevalent in the Middle and South Atlantic regions.

Meningococcus meningitis.—There were 390 cases of meningococcus meningitis reported for the 4 weeks ended April 25, as compared with 225, 157, and 176 cases for the corresponding period in 1941, 1940, and 1939, respectively. The number of cases was almost 75 percent above the number reported last year, which figure (225 cases) also represents the preceding 5-year average incidence for the period. While increases have been reported from widely scattered States the largest number of cases was reported from the Atlantic Coast regions, with minor excesses from the South Atlantic, West North Central, West South Central, and Pacific regions; other regions reported a slight decrease.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—The incidence of diphtheria continued at a relatively low level, 872 cases being reported, as compared with 1,104 cases for the corresponding period in 1941 and an average of approximately 1,300 cases for the 5 preceding years. The situation was favorable in all sections of the country, each geographic region reporting fewer cases than normally occur at this season of the year.

Influenza.—The incidence of influenza was also relatively low. For the 4 weeks ended April 25 there were 11,481 cases reported, which number was about 65 percent of the figure for this period in 1941 and about 80 percent of the 1937–41 median incidence for the period. In the Mountain region the number of cases was about twice the seasonal expectancy and in the Pacific region there was a very insignificant increase, while in all other regions the incidence was comparatively low.

Poliomyelitis.—For the current period there were 53 cases of poliomyelitis reported, as compared with 74 for the corresponding period in 1941, this figure also representing the 1937–41 median incidence for this period. A few more cases than might normally be expected were reported from the North Atlantic regions, but in all other sections of the country the situation was quite favorable. The lowest incidence of this disease is normally reached at this season of the year.

Scarlet fever.—The number of cases (14,685) of scarlet fever was the lowest on record for this period. The New England and South Atlantic regions reported excesses over the average seasonal incidence, but all other regions reported a decline in the number of cases. The decline in the Middle Atlantic and East North Central regions was particularly significant, as this disease has been unusually prevalent in those regions in recent years.

Smallpox.—The reported cases (95) of smallpox dropped considerably below even the year 1941, when 146 cases were reported for this period. As the 1937–41 median covers a period of 3 years in which this disease was unusually prevalent, a better comparison is with the average (approximately 550 cases) but for more normal years; even then the current incidence is less than 20 percent of that figure.

Typhoid and paratyphoid fever.—For the current period there were 308 cases of typhoid fever reported, as compared with 291, 339, and 434 for the corresponding period in 1941, 1940, and 1939, respectively. While the current incidence was slightly higher than the 1941 figure, it was only about 70 percent of the average seasonal incidence. Each geographic region except the New England reported a comparatively low incidence.

Whooping cough.—The incidence of whooping cough was also relatively low, the number of cases (14,182) being about 75 percent of last year's figure and 90 percent of the average seasonal incidence (16,028 cases). The numbers of cases in the North Atlantic and East South Central regions were slightly above the average, but in all other regions the incidence was low.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended April 25, based on data received from the Bureau of the Census, was 11.8 per 1,000 inhabitants (annual basis), as compared with 12.0 for the corresponding period in 1941 and an average rate of 12.2 in the years 1939–41.

Number of reported cases of 9 communicable diseases in the United States during the 4-week period March 29–April 25, 1942, the number for the corresponding period in 1941, and the median number of cases reported for the corresponding period, 1937–41

Division	Current period	1941	5-year median	Current period	1941	5-year median	Current period	1941	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	872	1,104	1,322	11,481	17,745	14,019	96,465	218,982	59,402
New England	22	37	32	17	27	53	9,224	4,929	5,463
Middle Atlantic	132	155	229	71	154	125	10,294	67,213	18,818
East North Central	127	202	292	429	976	1,074	9,652	77,544	4,753
West North Central	91	82	111	298	303	329	10,319	7,223	5,220
South Atlantic	141	176	235	3,370	5,060	4,240	11,745	34,209	9,332
East South Central	83	88	103	917	1,887	1,887	1,634	12,154	1,484
West South Central	184	210	203	3,897	7,321	4,543	11,735	8,672	3,524
Mountain	44	70	66	1,240	706	633	5,167	3,832	3,777
Pacific	48	84	92	1,242	1,311	1,232	26,695	3,206	3,206
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	390	225	225	53	74	74	14,685	16,960	20,480
New England	45	14	14	2	2	1	1,876	1,253	1,315
Middle Atlantic	132	52	52	12	3	8	4,269	5,470	6,845
East North Central	25	25	28	7	10	10	4,219	5,632	7,335
West North Central	16	8	9	0	6	5	1,576	1,245	1,736
South Atlantic	76	56	54	10	24	18	897	871	871
East South Central	35	41	41	6	9	9	620	1,084	562
West South Central	28	16	19	7	10	11	292	374	374
Mountain	5	2	6	5	4	4	409	451	494
Pacific	28	11	11	4	6	6	527	580	1,006
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [3]		
United States	95	146	1,267	308	291	434	14,182	18,695	[3] 16,028
New England	0	0	0	14	12	14	1,573	1,291	1,285
Middle Atlantic	0	0	0	54	47	61	3,724	3,016	3,515
East North Central	9	57	321	36	25	48	2,902	3,705	3,033
West North Central	21	48	451	15	8	19	531	1,593	859
South Atlantic	1	8	6	79	94	83	1,467	3,081	2,611
East South Central	15	0	18	35	23	48	666	748	549
West South Central	43	19	44	52	50	112	798	1,596	1,374
Mountain	1	0	55	6	12	15	815	1,122	852
Pacific	5	14	114	17	20	28	1,706	2,543	1,963

[1] Mississippi, New York, and Pennsylvania excluded; New York City included.
[2] Mississippi excluded.
[3] Four-year (1938–41) average.

DEATHS DURING WEEK ENDED MAY 2, 1942

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended May 2, 1942	Corresponding week, 1941
Data from 87 large cities of the United States:		
Total deaths	8,541	8,257
Average for 3 prior years	8,256	
Total deaths, first 17 weeks of year	153,176	156,493
Deaths per 1,000 population, first 17 weeks of year, annual rate	12.6	12.9
Deaths under 1 year of age	605	473
Average for 3 prior years	475	
Deaths under 1 year of age, first 17 weeks of year	9,641	8,966
Data from industrial insurance companies:		
Policies in force	65,234,283	64,542,842
Number of death claims	12,164	12,336
Death claims per 1,000 policies in force, annual rate	9.7	10.0
Death claims per 1,000 policies, first 17 weeks of year, annual rate	10.2	10.7

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 9, 1942

Summary

Of the 9 common communicable diseases included in the following table, and for which comparable data are available for prior years, the current weekly incidence of only two—measles and meningococcus meningitis—is above the 5-year (1937–41) median. The accumulated figures to date (first 18 weeks) this year are also above the median for these two diseases.

Measles is especially prevalent, with a higher incidence than last year, in the New England, West North Central, and Pacific States. In the latter group, California reported 5,724 of the total of 23,979 cases for the current week. The 5-year median is 15,821 cases, while 39,248 cases were reported for the corresponding week last year.

The number of cases of meningococcus meningitis increased from 80 to 89, with the highest incidence continuing in the eastern States—New England and Middle and South Atlantic—and the West South Central area, especially New York (19) and Maryland (8), Massachusetts (7), Maine (6), and Texas (7).

Whooping cough, local epidemics of which have been reported from certain cities, is below the 4-year (1938–41) average for the country as a whole both for the current week and for the accumulated total to date.

The current incidence of diphtheria, scarlet fever, and smallpox is below that for the corresponding period of any prior year. Of 18 cases of smallpox, 5 cases were reported in the East North Central States and 5 cases in Texas.

Other reports include 3 cases of leprosy in Texas and 1 case in California, 10 cases of Rocky Mountain spotted fever (1 case in Missouri and the remainder in northwestern States), 15 cases of tularemia, and 28 cases of endemic typhus fever (15 in Texas and 7 in Georgia).

The death rate for 88 large cities in the United States for the current week is 11.6 per 1,000 population, as compared with 12.0 for the preceding week and a 3-year average of 11.9 for the corresponding week. The cumulative total to date this year is 12.5 as compared with 12.8 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended May 9, 1942, and comparison with corresponding week of 1941 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis (meningococcus)		
	Week ended		Median 1937–41	Week ended		Median 1937–41	Week ended		Median 1937–41	Week ended		Median 1937–41
	May 9, 1942	May 10, 1941		May 9, 1942	May 10, 1941		May 9, 1942	May 10, 1941		May 9, 1942	May 10, 1941	
NEW ENG.												
Maine	0	1	1	------	1	1	142	51	56	6	1	0
New Hampshire	1	0	0	------	2	------	13	48	48	0	0	0
Vermont	1	3	1	------	------	------	154	66	44	0	0	0
Massachusetts	2	4	4	------	------	------	1,305	848	713	7	5	0
Rhode Island	1	0	0	------	------	------	225	8	66	0	0	2
Connecticut	2	1	2	1	------	1	556	422	373	1	1	0
MID. ATL.												
New York	15	20	23	[1]8	[1]5	[1]7	929	4,257	2,181	19	7	7
New Jersey	4	3	6	4	10	6	906	2,527	1,070	4	1	1
Pennsylvania	8	13	20	2	------	------	1,711	5,534	1,135	0	1	4
E. NO. CEN.												
Ohio	6	6	17	7	10	10	500	4,017	1,015	0	1	1
Indiana	2	13	5	4	1	6	216	1,026	771	2	1	1
Illinois	10	30	25	4	------	7	396	2,013	274	0	3	3
Michigan [2]	4	4	6	1	11	3	438	3,027	661	2	2	1
Wisconsin	0	0	1	32	30	56	1,389	1,800	803	0	0	0
W. NO. CEN.												
Minnesota	1	4	3	------	------	2	875	31	135	0	2	2
Iowa	0	0	2	------	17	2	259	246	253	0	0	0
Missouri	1	1	4	1	6	6	378	569	24	3	0	0
North Dakota	1	0	0	------	1	6	35	21	20	0	0	0
South Dakota	0	1	1	------	1	1	23	10	2	0	0	0
Nebraska	6	0	1	11	------	------	416	35	76	0	0	0
Kansas	5	9	6	1	7	4	557	905	509	0	0	1
SO. ATL.												
Delaware	1	0	0	------	------	------	23	98	10	1	0	0
Maryland [2]	4	2	2	11	5	7	500	356	292	8	5	2
Dist. of Col.	1	1	2	------	1	------	121	257	103	3	0	1
Virginia	5	4	9	143	243	114	289	1,656	490	4	4	4
West Virginia	5	10	4	19	10	20	102	621	88	2	0	3
North Carolina	4	8	8	11	1	21	543	1,688	866	0	2	1
South Carolina	1	4	4	167	213	213	141	595	55	3	0	1
Georgia	1	3	3	17	35	35	164	470	144	1	0	1
Florida	6	0	2	4	11	2	306	547	209	0	0	0
E. SO. CEN.												
Kentucky	5	5	5	7	8	12	54	875	206	0	3	7
Tennessee	9	3	3	18	35	42	123	685	179	2	3	2
Alabama	5	6	3	49	57	57	198	391	264	3	0	1
Mississippi [2]	6	9	6	------	------	------	------	------	------	1	2	2
W. SO. CEN.												
Arkansas	12	2	3	42	21	46	111	301	155	1	2	0
Louisiana	2	1	9	3	6	9	191	43	43	2	1	1
Oklahoma	5	6	6	43	47	74	176	190	190	2	1	1
Texas	36	16	22	407	510	365	1,293	1,106	1,070	7	2	2
MOUNTAIN												
Montana	1	1	1	------	4	4	81	35	35	0	0	0
Idaho	1	1	0	------	------	1	57	28	30	0	0	0
Wyoming	0	0	0	110	------	------	67	80	25	0	0	0
Colorado	4	9	9	45	23	4	202	526	331	0	0	0
New Mexico	1	0	0	1	1	1	35	272	111	0	0	0
Arizona	1	2	1	56	55	50	127	78	73	0	0	0
Utah	0	0	0	5	6	3	1,402	64	77	0	1	0
Nevada [2]	0	0	------	------	23	------	24	105	------	0	0	------
PACIFIC												
Washington	1	0	0	5	------	------	377	42	47	1	1	1
Oregon	0	3	0	14	7	25	125	266	88	0	0	0
California	10	7	28	70	29	36	5,724	412	412	4	2	1
Total	197	216	295	1,323	1,453	1,411	23,979	39,248	15,821	89	54	54
18 weeks	5,075	4,952	8,180	72,359	475,735	152,532	329,134	616,866	242,810	1,400	910	910

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 9, 1942, and comparison with corresponding week of 1941 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1937–41	Week ended		Median 1937–41	Week ended		Median 1937–41	Week ended		Median 1937–41
	May 9, 1942	May 10, 1941		May 9, 1942	May 10, 1941		May 9, 1942	May 10, 1941		May 9, 1942	May 10, 1941	
NEW ENG.												
Maine	0	0	0	14	12	18	0	0	0	0	0	0
New Hampshire	0	0	0	9	6	1	0	0	0	0	0	0
Vermont	0	0	0	7	3	4	0	0	0	2	0	0
Massachusetts	1	0	0	294	183	183	0	0	0	0	4	2
Rhode Island	0	0	0	12	18	12	0	0	0	0	0	0
Connecticut	0	0	0	30	67	84	0	0	0	3	2	0
MID. ATL.												
New York	1	3	2	408	480	769	0	0	0	4	5	6
New Jersey	0	1	0	147	287	223	0	0	0	5	1	2
Pennsylvania	1	1	1	423	402	467	0	0	0	6	4	7
E. NO. CEN.												
Ohio	1	0	0	314	297	297	0	0	0	11	3	5
Indiana	0	0	0	71	82	107	2	1	23	0	3	1
Illinois	3	0	0	143	340	451	1	4	4	5	5	5
Michigan [3]	0	0	0	148	263	374	1	5	5	0	0	1
Wisconsin	0	0	0	167	98	131	1	7	3	0	0	0
W. NO. CEN.												
Minnesota	0	0	0	79	39	77	0	0	10	0	0	0
Iowa	0	0	0	27	27	137	1	9	26	0	0	1
Missouri	0	0	0	55	138	138	0	1	19	0	1	1
North Dakota	0	0	0	17	5	5	0	3	3	3	2	1
South Dakota	0	0	0	21	15	14	0	0	1	0	0	0
Nebraska	0	0	0	24	12	23	0	0	4	0	0	0
Kansas	0	0	0	46	42	60	1	2	2	0	1	1
SO. ATL.												
Delaware	0	0	0	21	15	8	0	0	0	0	0	0
Maryland [3]	0	1	0	76	51	51	0	0	0	4	2	1
Dist. of Col.	0	0	0	5	5	14	0	0	0	0	0	0
Virginia	0	0	0	16	41	30	0	0	0	4	3	3
West Virginia	1	0	0	24	34	34	0	1	0	0	2	2
North Carolina	0	0	0	16	9	20	0	0	0	1	0	2
South Carolina	2	0	0	4	5	2	0	0	0	1	5	3
Georgia	1	0	1	5	19	11	1	0	0	6	4	4
Florida	0	6	1	3	1	6	0	0	0	17	12	4
E. SO. CEN.												
Kentucky	0	0	0	45	98	45	0	0	0	7	4	4
Tennessee	0	1	0	32	66	42	0	0	0	2	7	3
Alabama	1	0	1	13	15	4	0	0	0	4	1	5
Mississippi [3]	0	2	1	6	1	3	1	0	0	2	3	1
W. SO. CEN.												
Arkansas	0	0	1	3	6	6	2	0	0	1	2	3
Louisiana	0	1	0	1	3	5	0	0	0	5	1	7
Oklahoma	1	1	1	4	19	19	0	0	2	0	2	2
Texas	3	1	1	24	34	41	5	0	6	6	7	10
MOUNTAIN												
Montana	0	0	0	9	18	21	0	0	0	0	0	1
Idaho	0	0	0	0	6	6	0	0	3	0	1	1
Wyoming	0	0	0	17	9	11	0	0	0	0	0	0
Colorado	0	0	0	17	25	34	1	0	5	0	2	1
New Mexico	0	0	0	6	6	6	0	0	0	0	0	1
Arizona	0	0	0	6	2	11	0	0	0	0	0	2
Utah	0	0	0	11	11	11	0	0	0	0	1	0
Nevada [3]	0	0	------	------	2	------	0	0	------	0	1	------
PACIFIC												
Washington	0	0	0	35	11	31	0	0	3	0	3	3
Oregon	0	1	0	7	8	17	1	0	10	1	2	0
California	2	3	3	113	117	148	0	0	11	2	4	6
Total	18	22	21	2,975	3,453	4,807	18	33	252	102	100	110
18 weeks	376	399	376	69,339	67,562	90,400	395	819	5,737	1,405	1,408	1,990

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 9, 1942, and comparison with corresponding week of 1941—Continued.

Division and State	Whooping cough		Week ended May 9, 1942								
	Week ended		Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	May 9, 1942	May 10, 1941		Amebic	Bacillary	Unspecified					
NEW ENG.											
Maine	30	30	0	0	0	0	0	0	0	0	0
New Hampshire	3	114	0	0	0	0	0	0	0	0	0
Vermont	24	17	0	0	0	0	0	0	0	0	0
Massachusetts	258	215	0	0	2	0	0	0	0	0	0
Rhode Island	14	15	0	0	0	0	0	0	0	0	0
Connecticut	94	51	0	0	0	0	0	0	0	0	0
MID. ATL.											
New York	474	289	0	0	4	0	2	0	0	0	0
New Jersey	341	105	0	0	0	0	1	0	0	0	1
Pennsylvania	229	362	0	0	0	0	0	0	0	0	0
E. NO. CEN.											
Ohio	288	388	0	0	0	0	0	0	0	0	0
Indiana	42	36	0	0	0	0	0	0	0	0	0
Illinois	255	99	0	0	0	0	3	0	0	1	0
Michigan [1]	139	420	0	0	0	0	0	0	0	0	0
Wisconsin	247	134	0	0	0	0	0	0	0	0	0
W. NO. CEN.											
Minnesota	20	130	0	0	0	0	0	0	0	0	0
Iowa	18	65	0	0	0	0	0	0	0	0	0
Missouri	8	55	0	1	0	0	0	0	1	0	0
North Dakota	13	33	0	0	0	0	0	0	0	0	0
South Dakota	1	31	0	0	0	0	0	0	0	0	0
Nebraska	0	7	0	0	0	0	0	0	0	0	0
Kansas	36	129	0	0	0	0	0	0	0	0	0
SO. ATL.											
Delaware	0	1	0	0	0	0	0	0	0	0	0
Maryland [1]	52	102	0	0	0	0	0	0	0	0	0
Dist. of Col	12	20	0	1	0	0	0	0	0	0	0
Virginia	43	90	0	1	0	31	0	0	0	0	0
West Virginia	11	46	0	0	0	0	0	0	0	0	0
North Carolina	115	300	0	0	0	0	0	0	0	0	0
South Carolina	64	148	0	0	0	0	0	0	0	0	1
Georgia	55	28	0	1	1	0	0	0	0	1	7
Florida	62	9	0	0	0	0	0	0	0	0	2
E. SO. CEN.											
Kentucky	79	59	0	0	0	0	0	0	0	0	0
Tennessee	55	64	0	1	0	0	1	0	0	2	0
Alabama	44	51	0	0	0	0	0	0	0	0	1
Mississippi [2]	------	------	0	0	0	0	0	0	0	3	1
W. SO. CEN.											
Arkansas	8	50	0	4	0	0	0	0	0	0	0
Louisiana	2	36	0	1	0	0	0	0	0	2	0
Oklahoma	2	42	0	0	0	0	0	0	0	0	0
Texas	347	300	0	5	51	0	2	3	0	1	15
MOUNTAIN											
Montana	17	17	0	0	0	0	0	0	6	0	0
Idaho	4	31	0	0	0	0	0	0	2	1	0
Wyoming	1	1	0	0	0	0	0	0	0	0	0
Colorado	18	189	0	0	0	0	0	0	1	0	0
New Mexico	29	23	0	0	0	0	0	0	0	0	0
Arizona	26	28	0	0	0	33	0	0	0	0	0
Utah	21	50	0	0	0	0	0	0	0	4	0
Nevada [2]	4	10	0	0	0	0	0	0	0	0	0
PACIFIC											
Washington	70	169	0	0	0	0	0	0	0	0	0
Oregon	19	8	0	0	0	0	0	0	0	0	0
California	283	726	0	1	0	0	0	1	0	0	0
Total	3,977	5,323	0	16	58	64	9	4	10	15	28
18 weeks	69,361	82,234	------	------	------	------	------	------	------	------	------

[1] New York City only. [2] Period ended earlier than Saturday.

WEEKLY REPORTS FROM CITIES

City reports for week ended April 25, 1942

This table lists the reports from 89 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	1	0	3	0	3	0	2	0	1	0	0	0
Baltimore, Md	0	0	3	4	382	3	10	0	30	0	0	46
Barre, Vt	0	0	0	0	0	0	0	0	0	0	0	0
Billings, Mont	0	0	0	0	10	0	1	0	0	0	0	2
Birmingham, Ala	0	0	10	1	10	0	2	0	2	0	0	1
Boise, Idaho	0	0	0	0	1	0	0	0	0	0	0	0
Boston, Mass	1	0	0	0	269	3	14	0	112	0	0	41
Bridgeport, Conn	0	0	0	0	20	0	2	0	5	0	0	2
Brunswick, Ga	0	0	0	0	5	0	0	0	0	0	0	0
Buffalo, N. Y	0	0	0	0	11	0	6	0	17	0	0	3
Camden, N. J	0	0	0	0	6	0	0	0	16	0	0	2
Charleston, S. C	0	0	15	2	3	0	2	0	0	0	0	3
Charleston, W. Va	0	0	0	0	0	0	0	0	1	0	0	0
Chicago, Ill	10	0	2	1	107	1	26	0	64	0	0	101
Cincinnati, Ohio	2	0	0	0	2	0	5	0	25	0	0	6
Cleveland, Ohio	0	0	3	0	6	0	6	0	59	0	0	46
Columbus, Ohio	1	0	1	1	49	0	7	0	9	0	0	4
Concord, N. H	0	0	0	0	0	0	0	0	1	0	0	0
Cumberland, Md	0	0	0	0	0	0	1	0	0	0	0	0
Dallas, Tex	0	0	0	0	154	0	2	0	4	0	1	2
Denver, Colo	3	0	12	0	153	0	4	0	1	0	0	2
Detroit, Mich	1	0	1	2	39	1	14	0	124	0	0	65
Duluth, Minn	0	0	0	0	11	0	0	0	6	0	0	0
Fall River, Mass	2	0	0	0	38	0	2	0	37	0	0	1
Fargo, N. Dak	0	0	0	0	2	0	2	0	0	0	0	0
Flint, Mich	0	0	0	0	2	0	2	0	3	0	0	1
Fort Wayne, Ind	0	0	0	0	1	0	4	0	0	0	0	5
Frederick, Md	0	0	0	0	0	0	0	0	0	0	0	0
Galveston, Tex	0	0	0	0	4	0	2	0	0	0	0	0
Grand Rapids, Mich	1	0	0	0	0	0	1	0	2	0	0	0
Great Falls, Mont	0	0	0	0	64	0	3	0	0	0	0	6
Hartford, Conn	1	0	0	0	52	1	2	0	3	0	0	3
Helena, Mont	0	0	0	0	0	0	0	0	0	0	0	0
Houston, Tex	2	0	0	0	106	0	7	0	1	0	0	0
Indianapolis, Ind	2	0	0	2	87	0	7	0	33	0	0	19
Kansas City, Mo	0	0	0	0	147	1	6	0	34	0	0	0
Kenosha, Wis	0	0	0	0	13	0	0	0	1	0	0	11
Los Angeles, Calif	3	0	11	0	702	2	14	1	9	0	3	17
Lynchburg, Va	0	0	0	0	0	0	1	0	0	0	0	20
Memphis, Tenn	0	0	4	2	15	0	1	0	8	1	0	16
Milwaukee, Wis	0	1	1	1	123	1	1	0	41	0	0	64
Minneapolis, Minn	1	0	0	0	464	0	1	0	9	0	0	4
Missoula, Mont	0	0	0	0	0	0	0	0	1	0	0	0
Mobile, Ala	0	0	0	1	3	1	2	0	1	0	1	0
Nashville, Tenn	0	0	0	1	6	0	0	0	3	0	0	0
Newark, N. J	0	0	0	1	216	0	5	0	22	0	0	35
New Haven, Conn	0	0	0	0	211	0	0	0	1	0	0	3
New Orleans, La	0	0	2	2	73	1	6	0	5	0	2	1
New York, N. Y	19	2	6	0	111	11	64	1	281	0	4	270
Omaha, Nebr	0	0	0	0	228	0	1	0	0	0	0	10
Philadelphia, Pa	0	0	2	0	56	2	17	0	261	0	1	13
Pittsburgh, Pa	1	0	0	2	12	1	9	0	23	0	0	13
Portland, Me	0	0	0	0	6	0	1	0	3	0	0	6
Providence, R. I	0	0	0	0	215	0	1	0	5	0	0	14
Pueblo, Colo	0	0	0	0	6	0	0	0	0	0	0	0
Racine, Wis	0	0	0	0	150	0	0	0	3	0	0	18
Raleigh, N. C	0	0	0	1	2	0	0	0	1	0	0	0
Reading, Pa	0	0	0	0	5	0	1	0	0	0	0	2
Richmond, Va	0	0	2	0	4	0	2	0	1	0	0	1

See footnotes at end of table.

City reports for week ended April 25, 1942—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Roanoke, Va.	0	0	0	0	0	0	0	0	1	0	0	0
Rochester, N. Y.	0	0	0	0	7	0	3	0	3	0	0	3
Sacramento, Calif.	0	0	0	0	107	0	3	0	3	0	0	27
Saint Joseph, Mo.	0	0	0	0	5	0	1	0	0	0	0	0
Saint Louis, Mo.	3	0	0	0	145	1	10	0	15	0	0	0
Saint Paul, Minn.	0	0	0	0	263	0	8	0	4	0	0	23
Salt Lake City, Utah	0	0	0	0	83	0	1	0	2	0	0	8
San Antonio, Tex.	1	0	4	1	21	0	0	0	0	0	0	0
San Francisco, Calif.	1	0	0	0	373	0	12	0	7	0	0	14
Savannah, Ga.	0	0	14	0	3	0	0	0	0	0	0	3
Seattle, Wash.	0	0	0	0	78	1	3	0	2	0	0	31
Shreveport, La.	0	0	0	0	8	0	3	0	0	0	1	0
South Bend, Ind.	0	0	0	0	2	0	0	0	11	0	0	0
Spokane, Wash.	0	0	2	0	39	1	4	0	2	0	0	2
Springfield, Ill.	0	0	0	0	196	0	2	0	3	0	0	0
Springfield, Mass.	0	0	1	0	47	0	2	0	16	0	0	2
Superior, Wis.	0	0	0	0	0	0	0	0	4	0	0	5
Syracuse, N. Y.	0	0	0	0	169	0	3	0	2	0	1	28
Tacoma, Wash.	1	0	0	0	3	0	4	0	0	0	0	2
Tampa, Fla.	0	0	1	0	40	0	2	0	1	0	0	4
Terre Haute, Ind.	0	0	0	1	4	0	0	0	0	0	0	0
Topeka, Kans.	0	0	0	0	80	0	1	0	4	0	0	5
Trenton, N. J.	0	0	0	0	2	0	5	0	5	0	0	4
Washington, D. C.	1	0	2	1	112	1	8	0	13	0	0	13
Wheeling, W. Va.	0	0	0	0	8	0	0	0	0	0	0	1
Wichita, Kans.	0	0	1	0	91	0	5	0	4	0	0	0
Wilmington, Del.	0	0	0	0	3	0	5	0	2	0	0	0
Wilmington, N. C.	0	0	0	0	7	0	2	0	0	0	0	0
Winston-Salem, N. C.	0	0	0	0	29	0	0	0	0	0	0	0
Worcester, Mass.	0	0	0	0	7	0	8	0	13	0	0	51

Anthrax.—Cases: Philadelphia, 1.
Dysentery, amebic.—Cases: Chicago, 1; New York, 3; Philadelphia, 1.
Dysentery, bacillary.—Cases: Dallas, 1; Los Angeles, 2, New York, 5.
Leprosy.—Cases: Los Angeles, 1; Spokane, 1.
Tularemia.—Cases: Memphis, 1.
Typhus fever.—Cases: Houston, 1; New York, 1; Terre Haute, 1.
Undulant fever.—Cases: Grand Rapids, 1.

Rates (annual basis) per 100,000 population for the group of 89 cities in the preceding table (estimated population, 1942, 34,002,348)

Period	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Typhoid fever cases	Whooping cough cases
		Cases	Deaths						
Week ended Apr. 25, 1942	8.89	15.80	4.14	965.65	55.82	212.54	0.15	2.15	183.25
Average for week, 1937-41	14.70	26.16	7.43	[1]713.72	83.58	286.51	2.63	2.79	190.39

[1] Median.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—A rat found on February 28, 1942, and another rat found on March 25, 1942, both in Paauhau, Hamakua District, Island of Hawaii, T. H., have been proved positive for plague.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 11, 1942.—During the week ended April 11, 1942, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		5		2	5			1	7	20
Chickenpox		3		105	186	33	27	18	129	501
Diphtheria		25		19	3	7	3		1	58
Dysentery				2					2	4
German measles		3		20	69	12	12	4	30	150
Influenza		28			27	3			14	72
Lethargic encephalitis				2						2
Measles		1		168	185	180	7	15	18	574
Mumps	1	20		403	387	89	109	42	376	1,427
Pneumonia		27			20	3	1		14	65
Poliomyelitis			11							11
Scarlet fever	8	25	3	109	255	41	10	86	30	567
Smallpox							1			1
Trachoma								1		1
Tuberculosis	1	9	10	58	50				48	176
Typhoid and paratyphoid fever				15	6				1	22
Undulant fever					1				1	2
Whooping cough		7		75	46	1	3	2	30	164
Other communicable diseases		9		2	232	111		1	10	365

JAMAICA

Communicable diseases—4 weeks ended April 11, 1942.—During the 4 weeks ended April 11, 1942, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		1	Poliomyelitis		2
Chickenpox	41	8	Scarlet fever		1
Diphtheria	1	3	Tuberculosis	29	74
Dysentery	3	1	Typhoid fever	4	34
Leprosy	1	2	Typhus fever	5	

SWEDEN

Notifiable diseases—January 1942.—During the month of January 1942, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	11	Poliomyelitis	21
Diphtheria	39	Scarlet fever	1,581
Dysentery	31	Syphilis	27
Epidemic encephalitis	1	Typhoid fever	9
Gonorrhea	1,006	Undulant fever	1
Paratyphoid fever	17	Weil's disease	8

SWITZERLAND

Notifiable diseases—January 1942.—During the month of January 1942, cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	16	Paratyphoid fever	4
Chickenpox	160	Poliomyelitis	40
Diphtheria	109	Scarlet fever	247
German measles	20	Tuberculosis	219
Influenza	45	Typhoid fever	2
Measles	602	Undulant fever	4
Mumps	182	Whooping cough	117

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Ceylon.—During the week ended April 4, 1942, 1 case of cholera was reported in Ceylon.

Typhus Fever

Algeria.—During the period April 1–10, 1942, 2,151 cases of typhus fever were reported in Algeria (263 cases in Algiers). During the period March 21–31, 1942, 2,473 cases were reported in Algeria (113 in Algiers).

Bulgaria.—For the week ended April 11, 1942, 33 cases of typhus fever were reported in Bulgaria.

France.—During the week ended April 25, 1942, 11 cases of typhus fever were reported in Marseille, and 1 case in Nice, France.

Hungary.—During the week ended April 18, 1942, 47 cases of typhus fever were reported in Hungary. For the preceding week 49 cases were reported.

Morocco.—During the week ended April 18, 1942, 1,376 cases of typhus fever were reported in Morocco.

Rumania.—During the week ended April 25, 1942, 171 cases of typhus fever were reported in Rumania.

Spain.—During the week ended April 11, 1942, 96 cases of typhus fever were reported in Spain (37 cases in Barcelona).

Yellow Fever

Ivory Coast—Divo Subdivision.—On April 28, 1942, 1 death from suspected yellow fever was reported in Divo Subdivision, Ivory Coast.

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COURT DECISION ON PUBLIC HEALTH

City held not liable for death of child on sewage disposal plant.—(Pennsylvania Superior Court; *Krepcho et al.* v. *City of Erie et al.*, 21 A.2d 461; decided July 26, 1941.) The plaintiffs brought an action against the city of Erie and certain of its officers to recover damages for the death of their 5-year-old son. The child was crushed to death between a large horizontal iron valve wheel and a slowly rotating platform of an outdoor clarifier tank, which were parts of a sewage disposal plant owned and operated by the city. The premises on which the disposal plant was situated were accessible either by a private road through a State soldiers' and sailors' home or by trespassing over the land of a railroad company. In order to get to the place where the death occurred the boy had to climb fifteen steps or mount a high bank and then ascend a 4-foot perpendicular ladder. The plaintiffs' evidence showed that, since the erection of the disposal plant, children frequently visited and used portions of the city's land and the rough grass plot owned by the railroad company immediately adjacent thereto as a playground and that, at intervals, they were seen on top of the machinery near the edge of the tanks where the valves were located. There was also testimony that adults and children trespassed daily across the city's premises in going fishing, boating, bathing, skating in season, gathering tomatoes which grew in the sludge, and carrying away the sludge of the sewage for fertilizing purposes.

The superior court held that the city was not liable, taking the view that it could not be said that the sewage disposal plant was an attractive nuisance and that the city was required to anticipate that a venturesome boy would be fatally injured by the machinery it had erected. While the land owned by the railroad company was generally

used as a place of recreation, the disposal plant, which, with the outfall sewer, cost about $2,000,000, could not, according to the court, be said to be for that purpose. Assuming that the not easily accessible machinery would attract curious children, its maintenance and operation were not equivalent to an invitation to go upon it. The doctrine of attractive nuisance was said by the court to be applicable only when there was proof that the appliance or condition in question was so accessible that it should be reasonably anticipated that children would come to it. The possibility of children reaching it was not enough. The court further stated that, while it was true that children did go upon the machinery involved in the instant case, the evidence showed that they were ordered away when discovered thereon. "The deceased boy when injured was at a place not easily accessible where he had no right to be."

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